ReadyBox™
Users Guide

P/N 5001733A Revision A

Notice Page

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REVISION HISTORY

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Audience Assumptions

This guide is for the person who designs computer related equipment, including but not limited to hardware and software design and system integration. Ampro Computers, Inc. assumes you are qualified in designing and implementing your hardware designs and its related software into your prototype computer equipment.

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Chapter 1 About This Manual

Purpose of this Manual

This manual is for designers of systems based on the Ampro ReadyBoard™ series of single board computers (SBCs) and the Ampro ReadyBox™ enclosure. This manual contains information that permits designers and integrators to create an embedded system based on system level requirements.

Information provided in this user guide manual includes:

- ReadyBox specifications
- Environmental requirements
- ReadyBox connector/pin numbers and definition
- ReadyBox Installation instructions
- ReadyBox assembly and board mounting instructions
- PC/104 Expansion I/O cutouts

Information not provided in this user guide manual includes:

- ReadyBoard information or operation
- BIOS Setup information

Reference Material

The following list of reference materials may be helpful for you to complete your integration design successfully. Most of this reference material is also available on the Ampro web site in the Embedded Design Resource Center. The Embedded Design Resource Center was created for embedded system developers to share Ampro's knowledge, insight, and expertise gained from years of experience.

Specifications

- EPIC Specification Revision 1.1, July 16, 2004

  Web site: http://www.epic-sbc.org/images/pdfs/EPICspec.pdf

- PC/104 Specification Revision 2.5, November 2003

  For latest revision of the PC/104 specifications, contact the PC/104 Consortium, at:

  Web site: http://www.pc104.org

Reference Manuals and QuickStart Guides

- ReadyBoard 550 Reference Manual and ReadyBoard 550 QuickStart Guide
- ReadyBoard 560 Reference Manual and ReadyBoard 560 QuickStart Guide
- ReadyBoard 700 Reference Manual and ReadyBoard 700 QuickStart Guide
- ReadyBoard 710 Reference Manual and ReadyBoard 710 QuickStart Guide
- ReadyBoard 800 Reference Manual and ReadyBoard 800 QuickStart Guide

Support Information

- ReadyBox product (mechanical) dimensions

  Web site: http://www.ampro.com

Related Ampro Products

Ampro provides the following choices for you to implement your ReadyBox based system.

Ampro ReadyBoard Products

- ReadySystem™

  The ReadySystem is a high performance, low cost turnkey system that comes with a specific ReadyBoard SBC installed into a ReadyBox enclosure with SODIMM memory, plus a 2 ½" hard disk drive pre-loaded with Linux® or another operating system. The ReadySystem provides all of the ReadyBoard product's standard PC-style connectors accessible on the front I/O panel, plus adds PC-style connectors for two additional serial ports (4 total), two additional USB ports (4 total), one parallel port connector, three audio connectors, and a slot for a CompactFlash card. You can install up to two PC/104, PCI-104, or PC/104-Plus expansion boards into the ReadySystem. The ReadySystem comes pre-tested and ready for application loading to provide customers with the fastest possible deployment of their embedded applications. Refer to the specific ReadySystem Users Guide on the web site or the Documentation and Support Software (Doc & SW) CD-ROM provided with the first system shipment (only) for more information.

- ReadyBoard™ 550 – This EPIC single board computer (SBC) used for high volume embedded applications provides designers with a low cost, low-power choice of high performance processors with the VIA Eden™ 1GHz ESP 10000, 533MHz ESP 5000, or 300MHz ESP 3000 CPUs. In addition to the standard ReadyBoard features (4.5" x 6.5" form factor, PC-style connectors, PC/104-Plus, +5 volt only power, etc.), the ReadyBoard 550 supports two primary IDE drives, one CompactFlash Socket on secondary IDE, eight GPIO pins, four RS232 serial ports with the RS485/RS422 option for two ports, dual 10/100BaseT Ethernet interfaces, four USB 1.1 ports, IrDA, and AC'97 sound ports. It also supports up to 512MB of SDRAM in an SODIMM socket and up to 32MB UMA of AGP 4X video with built-in LVDS, CRT, and 36-bit TFT support.

- ReadyBoard™ 560 – This EPIC single board computer (SBC) used for high volume embedded applications provides designers with a low cost, low-power alternative to the high cost of high performance processors. Through the use of advanced chipset technology with the VIA Eden 1GHz ESP 10000 CPU, the ReadyBoard 560 provides DDR memory, USB 2.0 ports, Gigabit Ethernet and advanced AGP 8x video. In addition to the standard ReadyBoard features (4.5" x 6.5" form factor, PC-style connectors, PCI-104, +5 volt only power, etc.), the ReadyBoard 560 supports two primary IDE drives, one CompactFlash Socket on secondary IDE, eight GPIO pins, four RS232 serial ports with the RS485/RS422 option for two ports, 10/100BaseT and 1000BaseT Gigabit Ethernet interfaces, four USB 2.0 ports, IrDA, and AC'97 sound ports. It also supports up to 1GB of DDR SDRAM in an SODIMM socket and up to 64MB UMA of AGP 8X video with built-in LVDS, CRT, and 36-bit TFT support.

- ReadyBoard™ 700 – This EPIC single board computer (SBC) is used for high volume embedded applications and provides designers with a low cost, low-power choice of high performance Intel 933MHz LV Pentium® III, 650MHz LV Celeron®, or 400MHz UL Celeron processors. In addition to the standard ReadyBoard features (4.5" x 6.5" form factor, PC-style connectors, PC/104-Plus, +5 volt only power, etc.), the ReadyBoard 700 supports two primary IDE drives, one CompactFlash Socket on secondary IDE, eight GPIO pins, four RS232 serial ports with the RS485/RS422 option for two ports, dual 10/100BaseT Ethernet interfaces, four USB 1.1 ports, IrDA, and AC'97 sound ports. It also supports up to 512MB of SDRAM in an SODIMM socket and up to 32MB UMA of AGP 4X video with built-in LVDS, CRT, and 36-bit TFT support.

- ReadyBoard™ 710 – This EPIC single board computer (SBC) used for high volume embedded applications provides designers with a low cost, low-power alternative to the high cost of high performance processors. Through the use of advanced chipset technology with the Intel 650MHz LV Celeron CPU, the ReadyBoard 710 provides DDR memory, USB 2.0 ports, Gigabit Ethernet and advanced AGP 8x video. In addition to the standard ReadyBoard features (4.5" x 6.5" form factor, PC-style connectors, PCI-104, +5 volt only power, etc.), the ReadyBoard 710 supports two primary IDE drives, one CompactFlash Socket on secondary IDE, eight GPIO pins, four RS232 serial ports with the RS485/RS422 option for two ports, 10/100BaseT and 1000BaseT Gigabit Ethernet interfaces, four USB 2.0 ports, IrDA, and AC'97 sound ports. It also supports up to 1GB of DDR SDRAM in an SODIMM socket and up to 64MB UMA of AGP 8X video with built-in LVDS, CRT, and 36-bit TFT support.
- ReadyBoard™ 800 – This EPIC single board computer (SBC) is used for high volume embedded applications and provides designers with a low cost, low-power choice of high performance Intel 1.4GHz LV Pentium M 738, 1.1GHz LV Pentium M, or 600MHz ULV Celeron M processor. In addition to the standard ReadyBoard features (4.5" x 6.5" form factor, PC-style connectors, PC/104-Plus, +5 volt only power, etc.), the ReadyBoard 800 supports two primary IDE drives, one CompactFlash Socket on secondary IDE, eight GPIO pins, four RS232 serial ports with the RS485/RS422 option for two ports, Gigabit 1000BaseT and 10/100BaseT Ethernet interfaces, four USB 2.0 ports, IrDA, and AC'97 sound ports. It also supports up to 1GB of DDR RAM in an SODIMM socket and up to 64MB UMA of AGP 4X video with built-in LVDS and CRT support.

Other Ampro Products

- CoreModule™ Family – These complete embedded-PC subsystems on single PC/104 or PC/104-Plus form-factor (3.6x3.8 inches) modules feature 486, VIA Eden ESPs, Celeron, and Celeron M CPUs. Each CoreModule includes a full complement of PC core logic functions, plus disk controllers, and serial and parallel ports. Most modules also include CRT and flat panel graphics controllers and/or an Ethernet interface. The CoreModules also come with built-in extras to meet the critical reliability requirements of embedded applications. These include onboard solid state disk compatibility, watchdog timer, smart power monitor, and Ampro embedded BIOS extensions.
- LittleBoard™ Family – These high-performance, highly integrated single-board computers use the EBX form factor (5.75x8.00 inches), and are available with the Intel Pentium M or Celeron M, Pentium III and Celeron, and VIA Eden processors. The EBX-compliant LittleBoard single-board computers offer functions equivalent to a complete laptop or desktop PC system, plus several expansion cards. Built-in extras to meet the critical requirements of embedded applications include onboard solid state disk capability, watchdog timer, smart power monitor, and Ampro embedded BIOS extensions.
- MiniModule™ Family – This extensive line of peripheral interface modules compliant with PC/104 and PC/104-Plus standards can be used with Ampro CoreModule, LittleBoard, and ReadyBoard single-board computers to configure embedded system solutions. Ampro's highly reliable MiniModule products currently support USB 2.0, IEEE 1394 (Firewire), Ethernet, PC Card expansion, analog/data acquisition, additional RS232/RS485 serial ports, and general-purpose I/O (GPIO).
- ETX Family – These high-performance, compact, rugged Computer-on-Module (COM) solutions use various x86 processors from VIA Eden ESP to Pentium M CPUs in an ETX Revision 2.6 form factor to plug into your custom baseboard. Each ETX module provides standard peripherals, including dual Ultra/DMA 33/66/100 IDE, floppy drive interface, PCI bus, ISA bus, serial, parallel, PS/2 keyboard and mouse interfaces, 10/100BaseT Ethernet, USB ports, Video, and AC'97 sound. ETX modules support up to 512MB or more of SODIMM DRAM. Optional –40°C to +85°C operation, along with tall FX8C connectors, and a 50% thicker PCB are available to meet your rugged application requirements.

- EnCore™ Family – These high-performance, compact, rugged Computer-on-Module (COM) solutions use various processor technologies including x86, MIPS®, and PowerPC™ architectures to plug into your custom baseboard. Each EnCore module provides standard peripherals, including Ultra/DMA 33/66/100 IDE, floppy drive interface, PCI bus, serial, parallel, PS/2 keyboard and mouse interfaces, 10/100BaseT Ethernet, and USB ports. Some EnCore modules also provide video and AC'97 sound. Depending on the model, EnCore modules support up to 256MB or 512MB of SODIMM DRAM. Extended temperature support up to +85°C is available.

Chapter 2 Product Overview

This product overview presents general information about the EPIC Architecture and the ReadyBox enclosure. After reading this chapter you should understand:

- EPIC architecture
- ReadyBox features
- I/O Panel features and connectors
- Specifications
- ReadyBox construction
- ReadyBox mounting dimensions

EPIC Architecture

In 2004, five companies collaborated to fill the void between the EBX size and the PC/104 size with a new industry standard form factor (115mm x 165mm, or ≈ 4.5" x 6.5") called "Embedded Platform for Industrial Computing (EPIC)." The EPIC standard principally defines physical size, mounting hole pattern, and power connector locations. It does not specify processor type or electrical characteristics. There are recommended connector placements for serial/parallel, Ethernet, graphics, and memory expansion, including an optional location for PC Card (PCMCIA) expansion. This embedded SBC standard ensures that embedded system OEMs can standardize their designs and that embedded computing solutions can be designed into even more space constrained environments than ever before.

The EPIC standard boasts the same highly flexible and adaptable system expansion as EBX, allowing easy and modular addition of functions such as USB 2.0, Firewire or wireless networking not usually contained in standard product offerings. The EBX system expansion is based on popular existing industry standards, PC/104™, PC/104-Plus™, and PCI-104™. PC/104 places the ISA bus on compact 3.6" x 3.8" modules with self-stacking capability. PC/104-Plus adds the power of a PCI bus to PC/104 while retaining the basic form-factor, but PCI-104 expansion cards only provide the PCI Bus to the PC/104 form-factor. Using PC/104 expansion cards, an EPIC board can be easily adapted to meet a variety of embedded applications.

The EPIC standard also brings stability to the mid-sized embedded board market and offers OEMs assurance that a wide range of products will be available from multiple sources – now and in the future. The EPIC specification is freely available to all interested companies, and may be used without licenses or royalties. For further technical information on the EPIC standard, visit the web site at http://www.epic-sbc.org. See Figure 2-1.

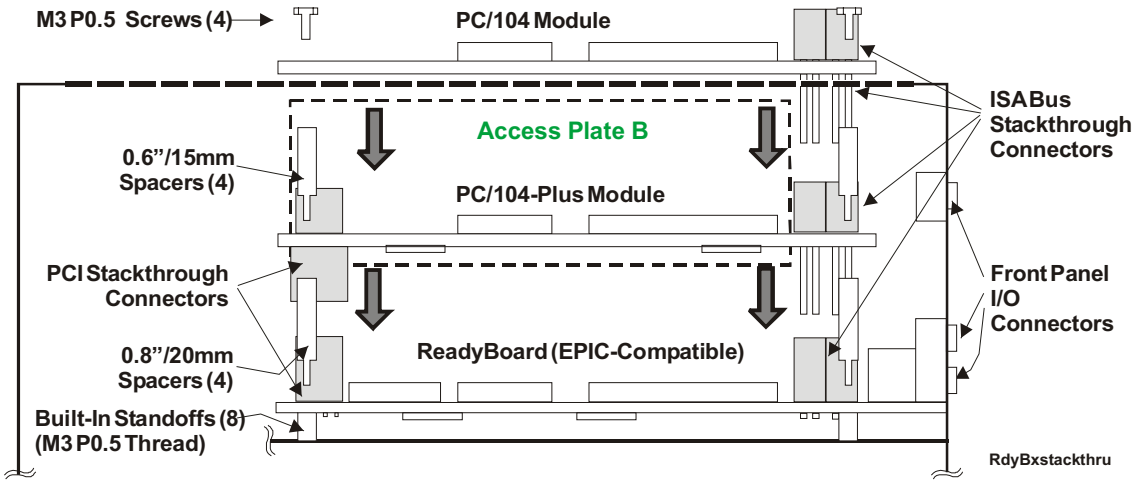


Figure 2-1. Stacking PC/104 Modules in ReadyBox (Side view)

Product Description

The ReadyBox is a small enclosure for Ampro's ReadyBoard products and will accept any Ampro ReadyBoard SBC. Embedded systems using the ReadyBox can be expanded through the PC/104, PC/104-Plus, or PCI-104 expansion buses found on Ampro's ReadyBoard SBCs for additional system I/O. These busses offer compact, self-stacking, modular expandability.

The PC/104 bus is an embedded system version of the signal set provided on a desktop PC's ISA bus. The PC/104-Plus bus includes this signal set, and in addition, signals implementing a PCI bus, available on an additional 120-pin (4 rows of 30 pins) PCI expansion bus connector. This PCI bus operates at clock speeds up to 33MHz. The PCI-104 bus only carries the PCI signal set and is primarily used with PCI-104 compatible expansion boards. The PCI-104 bus can also be used with some PC/104-Plus boards, and with the help of a special expansion ISA bus adapter board (MiniModule ISA) can be used with PC/104 boards.

The ReadyBox is particularly well suited to embedded applications and meets the size, power consumption, temperature range, quality, and reliability demands of many embedded systems.

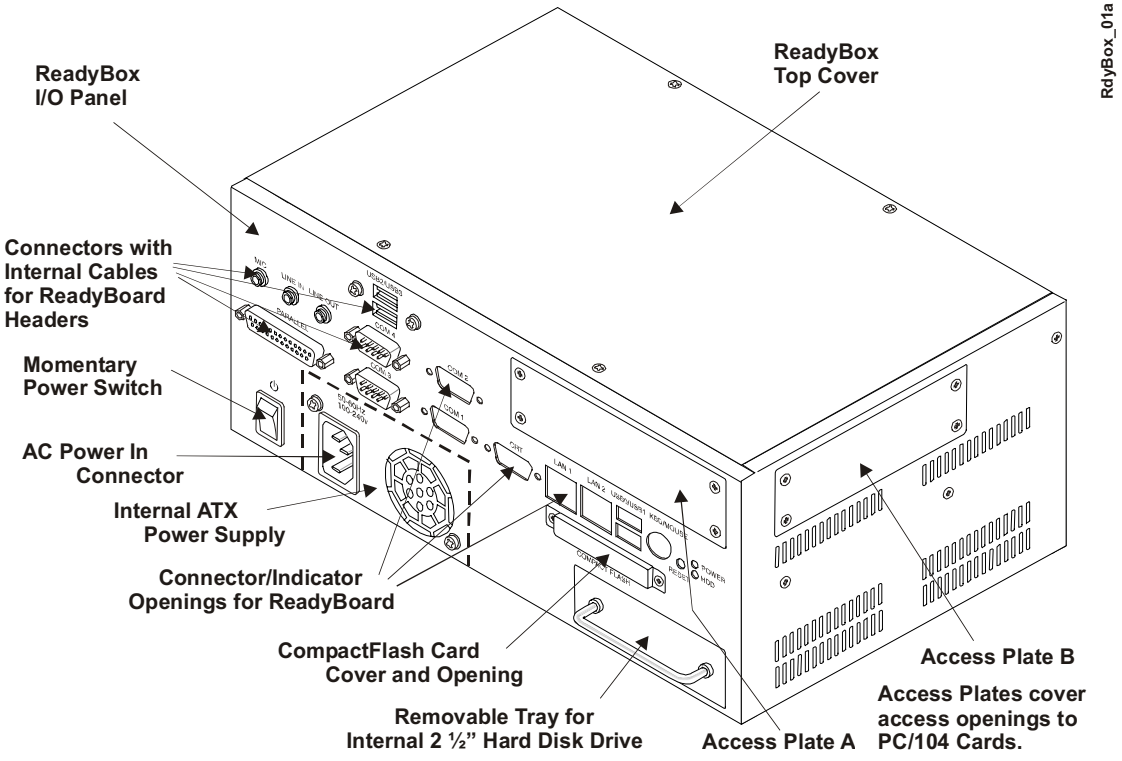


Figure 2-2. ReadyBox Enclosure

ReadyBox Features

- Compact size
- Quiet operation
- Accepts any Ampro ReadyBoard SBC
- Brings all ReadyBoard I/O to a single I/O panel
- Accepts two PC/104 expansion boards
- Easy access openings for PC/104 expansion board connectors or cabling
- Accepts any capacity 2 ½" Hard Disk Drive
- Mechanical
  - Flexible mounting – Wall or Benchtop (Surface)
  - All cabling provided internally
- Certification
  - Conforms to EMI Standards
  - Designed for UL/CSA/CE Approval (depends on the exact system assembled)
- Power
  - Momentary Power On/Off switch
  - 150W ATX power supply built in
  - 110/220V +/-10%, @ 50/60Hz, Auto-sense input

I/O Panel Description

Table 2-1 describes the connectors or controls on the I/O panel provided with the ReadyBox, and shown in Figure 2-3. Refer to Chapter 3, *Installing ReadyBox Options* for connector installation.

Table 2-1. Installed Connectors or Controls

Control/Connector	Description
Power Switch	This momentary push button Power switch controls AC power and is provided with the ReadyBox along with its internal cable. The integrator must connect it to the ReadyBoard through a 2-wire, 5-pin connector at the Utility connector.
AC Power In	This 3-prong connector is part of the internal ATX power supply and accepts 100-240 VAC, +/- 10% @ 50/60 Hz
Power Supply Fan	This fan is part of the internal ATX power supply and provides cooling to the power supply.
Parallel	This 25-pin connector and its internal cable are provided with the ReadyBox. The integrator must connect it to the ReadyBoard Floppy/Parallel connector.
MIC, Line In, Line Out	These three 2-pin connectors and the respective cable are provided with the ReadyBox. The integrator must connect these to the Audio In/Out connector on the ReadyBoard.
COM 3 & COM 4 (Serial 3 & Serial 4)	These two 9-pin connectors and the respective cables are provided with the ReadyBox. The integrator must connect these to the ReadyBoard Serial B connector.
USB 2 & 3	These two 4-pin connectors and the respective cables are provided with the ReadyBox. The integrator must connect these to the ReadyBoard USB header.
Hard Disk Drive (2 ½") Tray	This HDD tray assembly, provided with the ReadyBox, will hold a 2 ½" hard disk drive with a 44-pin connector along with its shock mounting.
CompactFlash cover and slot	This CompactFlash cover and slot (not shown) provided with the ReadyBox, ensures good EMI shielding and protects the CompactFlash card if installed.

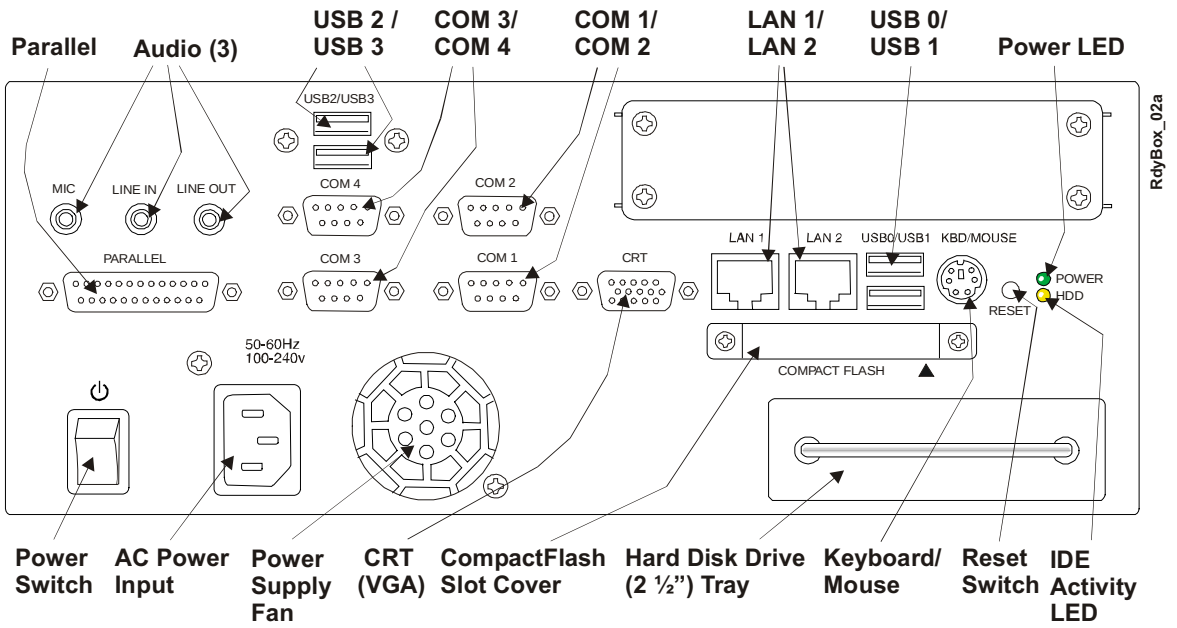


Figure 2-3. I/O Panel Controls and Connectors

Table 2-2 describes the connector, control, or indicator openings in the I/O panel provided with the ReadyBoard SBC, and shown in Figure 2-3.

Table 2-2. Connectors or Control/Indicator I/O Panel Openings

Access Opening	Description
Power-On LED	This power-on indicator is provided on the ReadyBoard.
HDD Activity LED	This IDE activity indicator shows when there is I/O activity for the IDE hard drive or CompactFlash card and is provided on the ReadyBoard.
Reset Switch	This reset switch is provided on the ReadyBoard. Pressing the Reset switch supplies a ground signal on the reset line causing a hard reset.
Keyboard/Mouse	This 6-pin single PS/2 Keyboard/Mouse connector is provided on the ReadyBoard. It requires a dual PS/2 output cable provided in the ReadyBoard SBC QuickStart kit.
USB 0 & 1	These two 4-pin USB type A connectors are provided on the ReadyBoard.
LAN 1 (Ethernet 1)	This 8-pin RJ45 connector is provided on the ReadyBoard.
LAN 2 (Ethernet 2)	This 8-pin or 10-pin RJ45 connector is provided on the ReadyBoard.
Video (CRT VGA)	This 15-pin DB15 connector is provided on the ReadyBoard.
COM 1 & COM 2 (Serial 1 & Serial 2)	These two 9-pin DB9 connectors are provided on the ReadyBoard.
CompactFlash socket	The CompactFlash socket (not shown) is provided on the underside of the ReadyBoard and accepts the CompactFlash card through the opening in the I/O panel of the ReadyBox, if installed.

Power/IDE LED Definitions

Table 2-3 provides the LED colors and definitions for the Power On and IDE drive activity LEDs. See Figure 2-3. Refer to the specific ReadyBoard SBCfor the Ethernet LED activity.

Table 2-3. Power/IDE Activity LED Indicators

LED#	On	Off
Power On LED	**Steady Green** = **Power On**	**Steady Off** = **Power Off**
IDE Activity LED	**Flashing Yellow** = **IDE activity** (2 ½" IDE drive or CompactFlash)	**Steady Off** = **No IDE** activity

Specifications

Environmental Specifications

Table 2-4 provides the most efficient operating and storage condition ranges required for the ReadyBoard SBC installed into the ReadyBox.

Table 2-4. Environmental Requirements

Parameter	Conditions
Temperature	
Operating	+0°to+50°C (32°to+122°F)
Storage	–20°to+75°C (–4°to+167°F)
Humidity	
Operating	5% to 95% relative humidity, non-condensing
Non-operating	5% to 95% relative humidity, non-condensing

Power Specifications

Table 2-5 list the power specifications of the ATX power supply installed in the ReadyBox.

Table 2-5. Power Supply Specifications

Parameter	Description
Input Type	Auto ranging, 100-240 VAC, +/-10%, @ 50/60 Hz
Output Type	Regulated DC voltages
	+3.3VDC +/-5% @ 10A Max (Not used by the ReadyBoard)
	+5VDC +/-5% @ 14A Max
	+12VDC +/-5% @ 4.2A Max (Required for the Enclosure fan, and used as an option on some ReadyBoards)
	-12VDC +/-10% @ 0.3A Max (Not used by the ReadyBoard)
	+5VDC Standby +/-5% @ 2A Max
Output Power MAX	150W (Output of +3.3V and +5V not to exceed 85W)

Cooling Fan Requirements

The ReadyBox only requires an additional cooling fan installed in the enclosure for specific ReadyBoard SBCs. Only the ReadyBoard SBCs listed in Table 2-6 require an additional fan installed in the enclosure. Refer to Chapter 3, *Installing ReadyBox Options* for more information and installation instructions.

Table 2-6. Additional Cooling Fan Required

Model	CPU Types Requiring Enclosure Fan	
ReadyBoard 550	VIA Eden ESP 10000	
ReadyBoard 560	VIA Eden ESP 10000	
ReadyBoard 700	Intel Celeron, 650MHz LV	Intel Pentium III, 933MHz LV
ReadyBoard 710	Intel Celeron, 650MHz LV	
ReadyBoard 800	Intel Pentium M, 1.1GHz LV	Intel Pentium M, 1.4GHz LV

Physical Specifications

Table 2-7 gives the physical dimensions of the ReadyBox as shown in Figures 2-4 and 2-5, and the mounting dimensions in Figures 2-6 and 2-7.

Table 2-7. Weight and Footprint Dimensions

Parameters	Measurements (Enclosure Only)	Additional Measurements
Weight	2.95kg (6.5lb)	
Height	115mm (4.52”)	123mm (4.84”) with plastic feet
Width	280mm (11.02”)	319.8mm (12.59”) with mounting brackets
Depth	180mm (7.08”)	195.50mm (7.69”) HDD Tray handle

Mechanical Specifications

Figures 2-4 through 2-7 show the ReadyBox dimensions, mounting and access plate locations, cover locations, and the mounting dimensions.

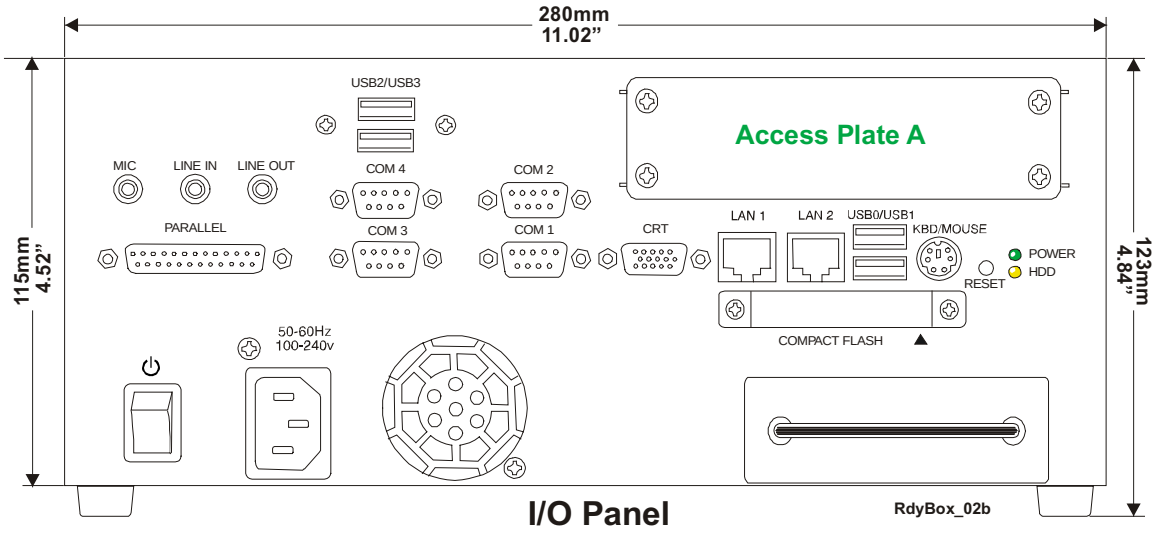


Figure 2-4. ReadyBox Width and Height Dimensions (Front view)

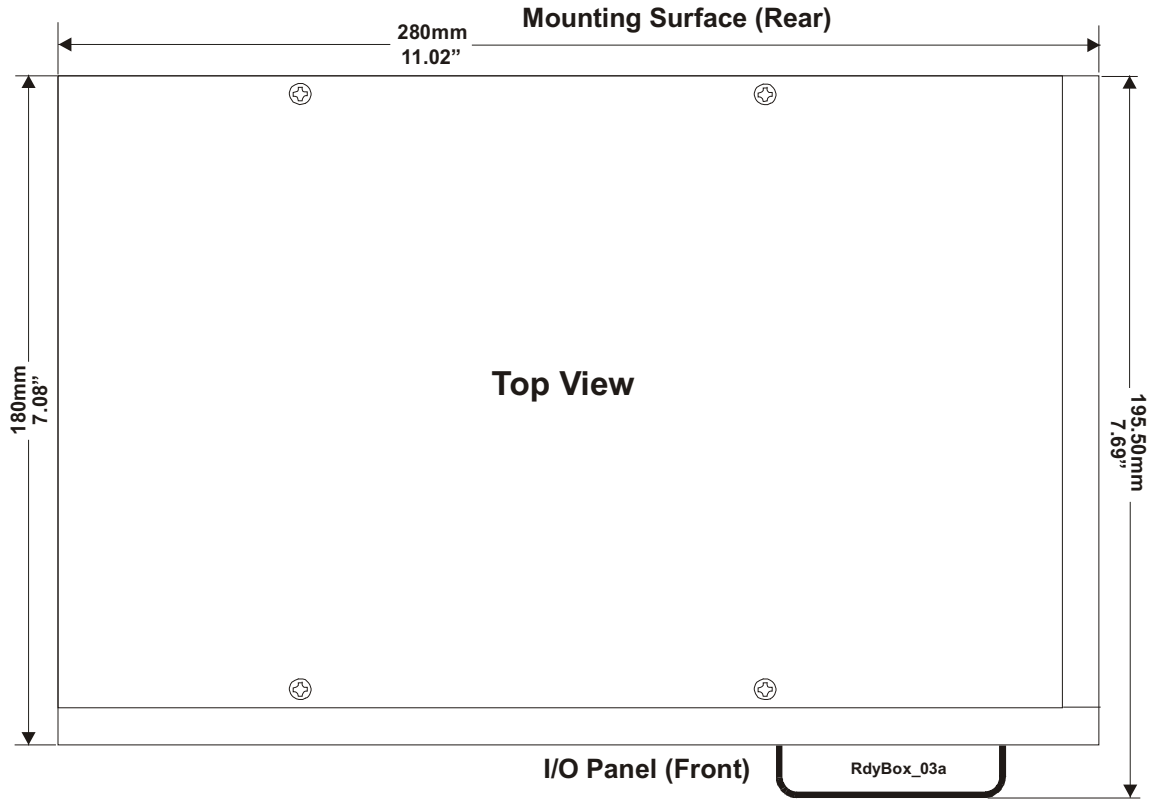
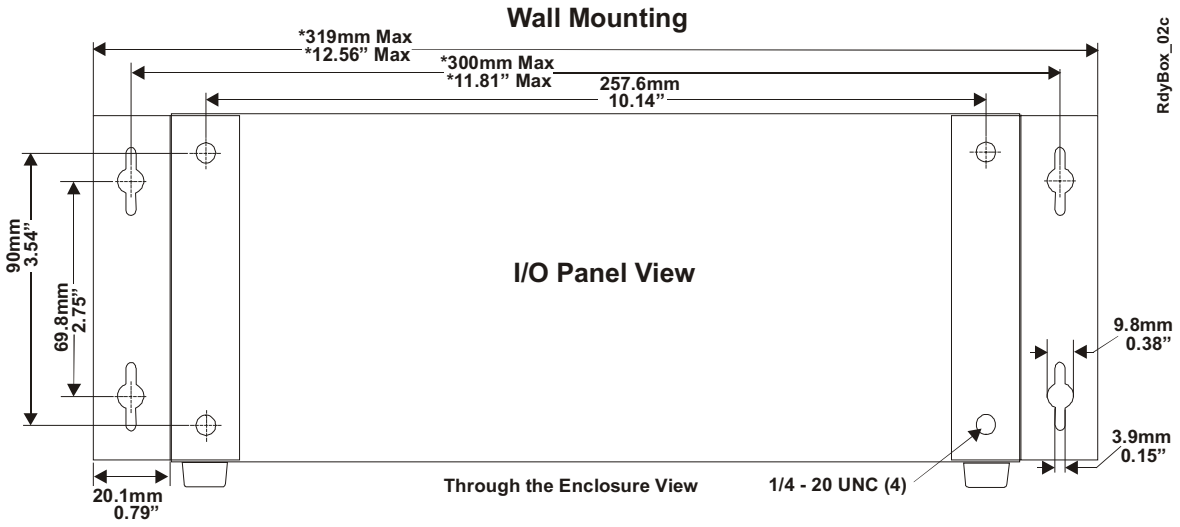
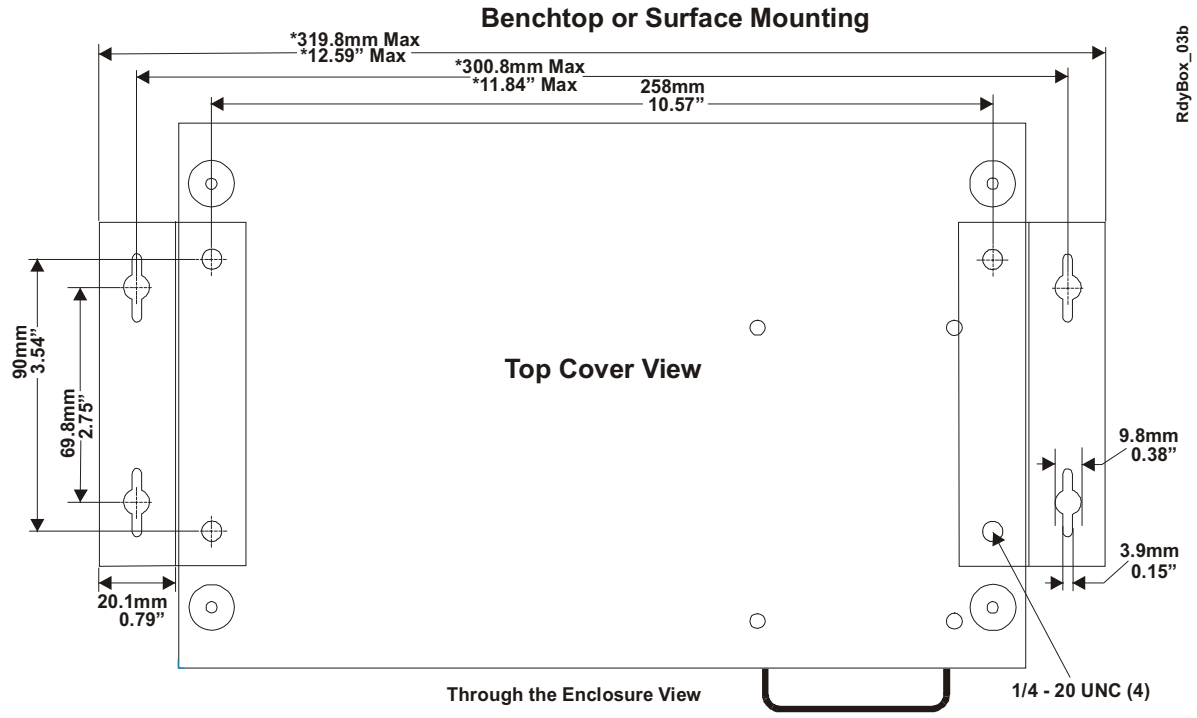


Figure 2-5. ReadyBox Width and Depth Dimensions (Top view)



*Note: Can subtract up to 1.75mm (0.068") from both ends due to hole size in mounting bracket placement.

Figure 2-6. ReadyBox Wall Mounting Dimensions (I/O Panel View)



*Note: Can subtract up to 1.75mm (0.068") from both ends due to hole size in mounting bracket placement.

Figure 2-7. ReadyBox Surface or Benchtop Mounting Dimensions (Top view)

Mounting Locations, Access Plates, and Covers

Figures 2-8 and 2-9 provide the mounting plate, access plate, and cover locations. The four optional plastic feet with screws are also shown in Figure 2-8.

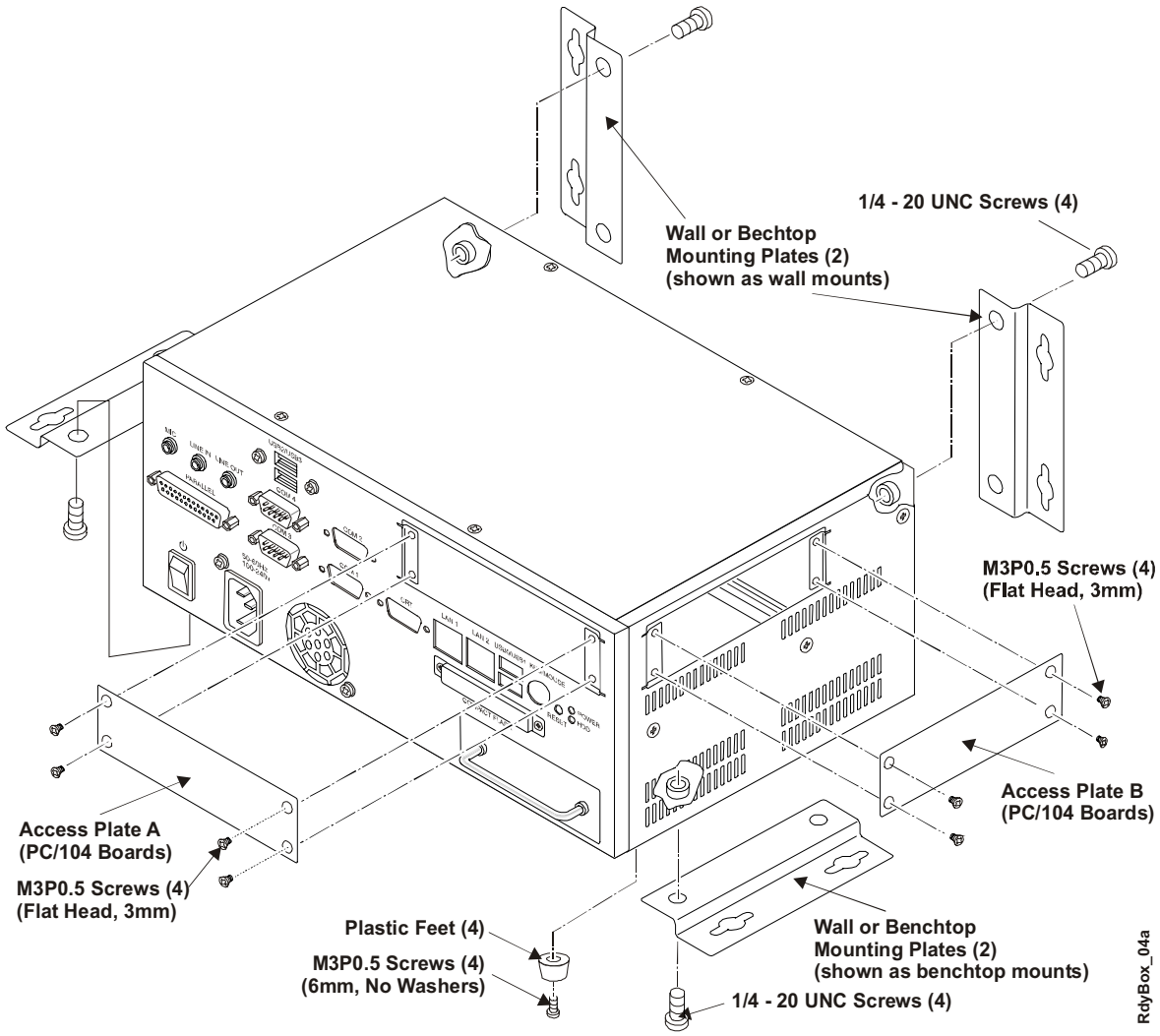


Figure 2-8. ReadyBox Mounting and PC/104 I/O Access Plate Locations

NOTE	The two access plates (A & B), shown in Figure 2-8 (used for PC/104 input/output connections) are not the same width. See Table 2-8.

Table 2-8. Access Plate Dimensions

	Access Plate A	Access Plate B
Width	114.53mm (4.509”)	105.62mm (4.158”)
Height	32.51mm (1.28”)	32.51mm (1.28”)

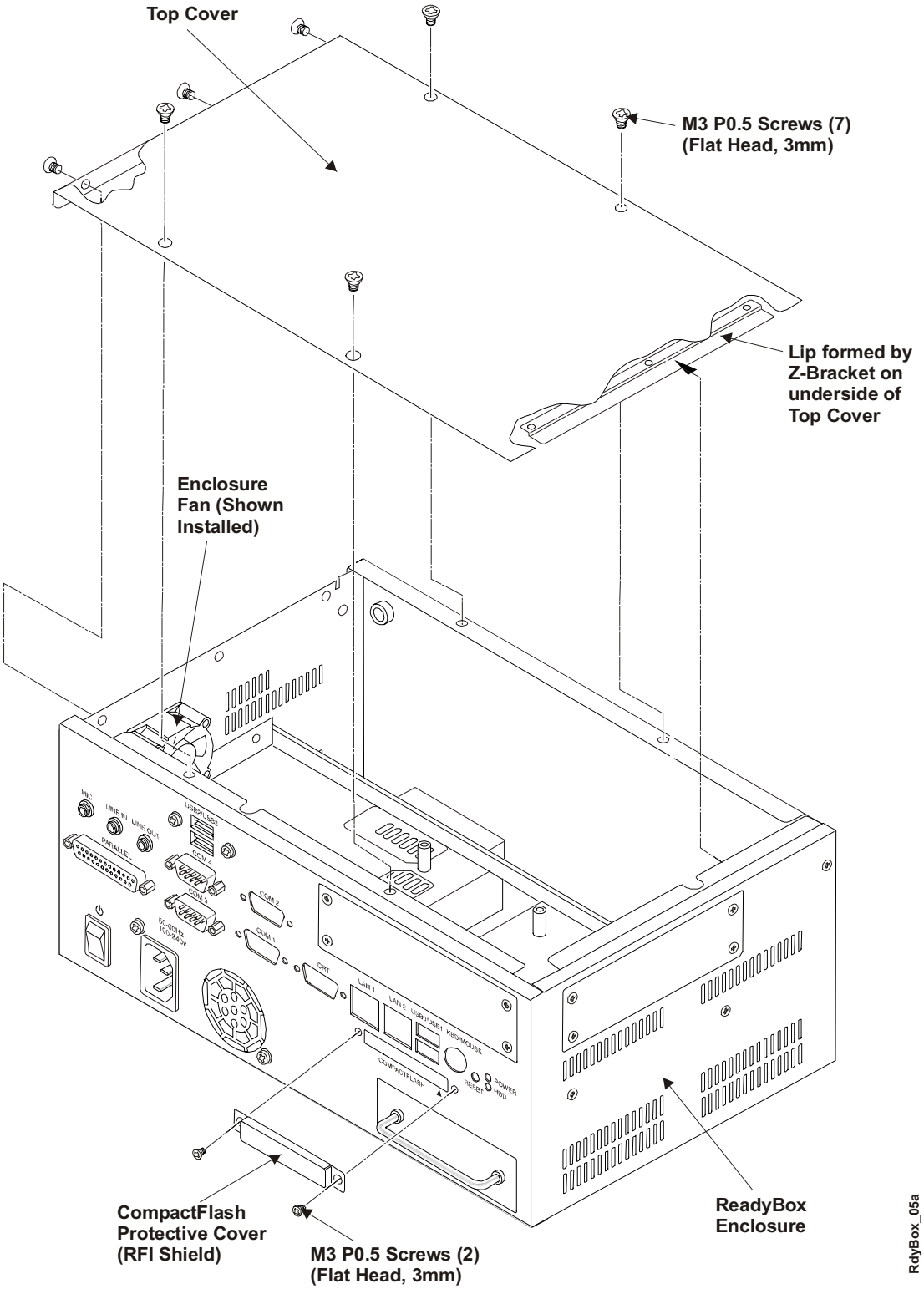


Figure 2-9. ReadyBox Cover Locations

CAUTION	To prevent damage to the top cover after removing the seven screws, you must slide the top cover to the left before lifting the top cover off the enclosure, due to the Z-bracket lip.

Chapter 3 Installing ReadyBox Options

This chapter describes the installation of the ReadyBoard SBC into the ReadyBox along with the various ReadyBox options. Please refer to the Reference Manual and QuickStart Guide mentioned in Chapter 1, for the specific ReadyBoard SBC your are installing into the ReadyBox.

ReadyBoard Installation/Removal

Refer to the following table for the specific items listed in the ReadyBox hardware kit and where the item will be used in the ReadyBox or ReadyBoard installation.

Table 3-1. ReadyBox Hardware Kit

No.	Description	Where Used
1	(1) Power Cord, US	AC input connector for 110 to 120 VAC 60 Hz
2	(1) Power Cord, European	AC input connector for 220 to 240 VAC 50 Hz
3	(1) System Fan, 40x40x20mm, 12V	Installed inside the enclosure for specific ReadyBoards requiring additional cooling. See Table 2-6.
4	(4) Fan Screws, (Self-tapping, M4.5, 8mm, Flat Head)	These self-tapping screws are installed thorough the enclosure wall into the hard plastic of the fan assembly.
5	(4) Standoffs, 0.6" (15mm) (M3P0.5 thread size)	If you install a second PC/104 type expansion board onto the first PC/104 or PC/104-Plus card, you will use the 0.6" (15mm) standoffs between the two boards. The first PC/104 type board installed on the ReadyBoard requires the 0.8” (20mm) standoffs provided with the ReadyBoard QuickStart Kit.
6	(2) Brackets, Wall Mount or Surface Mount	These Wall or Surface Mounts are connected to specific locations on the enclosure.
7	(4) Mounting Bracket Screws (1/4-20 UNC, Round Head)	Mounting screws for wall or surface mounting
8	(4) Feet, Plastic – Benchtop or Desktop Use	Mounted to bottom of the enclosure near the four corners of the ReadyBox enclosure.
9	(4) Screws, Plastic Feet, (No Washers, M3P0.5, 6mm)	Screws used for the securing plastic feet to bottom of enclosure.
10	(8) Screws, Mounting (M3P0.5, 6mm, Washers)	These screws are used for securing the ReadyBoard to eight standoffs on the enclosure shelf. In the event a PC/104 card is installed, only four screws are used to secure it to the ReadyBoard. The 0.8” (20mm) standoffs from the ReadyBoard QuickStart kit are inserted into the PC/104 mounting holes on the ReadyBoard. The remaining screws are used to secure the PC/104 or PC/104-Plus card(s) to the ReadyBoard.
11	(3) Cable Tie wraps	These cable tie wraps are provided for securing the wires and cables inside the enclosure. The cable tie wraps can be used with the cable tie mounting pads to secure the cables/wires to a flat surface.
12	(2) Cable Tie Mounting, Plastic (Self-adhesive)	Used to secure the cables/wires with the cable tie wraps to a flat surface.
13	(1) Cable Mounting Bracket Optional, (Metal)	Used to secure the 44-pin IDE cable under the enclosure shelf. However, access to the underside of the mounting shelf is difficult without removing the back cover.

Tools Required

Use these tools to install and remove the ReadyBoard into or out of the ReadyBox.

- Small to medium Phillips screwdriver
- Anti-static service kit - Use a complete anti-static service kit (or the equivalent) to remove or install the ReadyBoard. A complete anti-static service kit should include a static-dissipating work surface, a chassis clip lead, and a wrist or ankle strap.

NOTE	There are two methods of installing the ReadyBoard into the ReadyBox enclosure, but only one method is described here. Each method has its merits and ease of installation, but the method described here is the more basic of the two, and hopefully will be less confusing. The first method, and the one described here, requires you to fold and lay the Parallel cable in its path under the ReadyBoard, connecting it to the board, and then install the ReadyBoard into the enclosure, where you will connect the remaining cables to the board. The second method requires you to connect most of the cables to the ReadyBoard in the correct installation order and then install the board into the enclosure with most of the cables attached. The Parallel cable must be installed first, as it must be folded and laid in a path under the ReadyBoard to the floppy/parallel connector on the edge of the board.

Installing ReadyBoard into ReadyBox

1. Prepare the ReadyBox and ReadyBoard for installation.
   - If the ReadyBox is already prepared for ReadyBoard installation, with the top cover removed, the parallel cable in the correct position, and the power cord disconnected, skip to Step 7.

     This includes installing the correct size SODIMM onto the ReadyBoard, since you will not have access to the SODIMM socket once the ReadyBoard is installed into the ReadyBox.
   - If the ReadyBox is not ready for the ReadyBoard installation, continue with the next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the power cord has been removed from the power source. The ATX power supply inside the ReadyBox will continue to provide standby current to the connectors until the power cord is disconnected.

2. Disconnect the power cord from the AC power source.

CAUTION	To prevent damage to the Top Cover after removing the seven screws, you must slide the top cover to the left before lifting the Top Cover off the enclosure, due to the Z-Bracket Lip.

3. Remove the seven screws holding the top cover to the ReadyBox and then slide the cover to the left as shown in Figure 3-1.

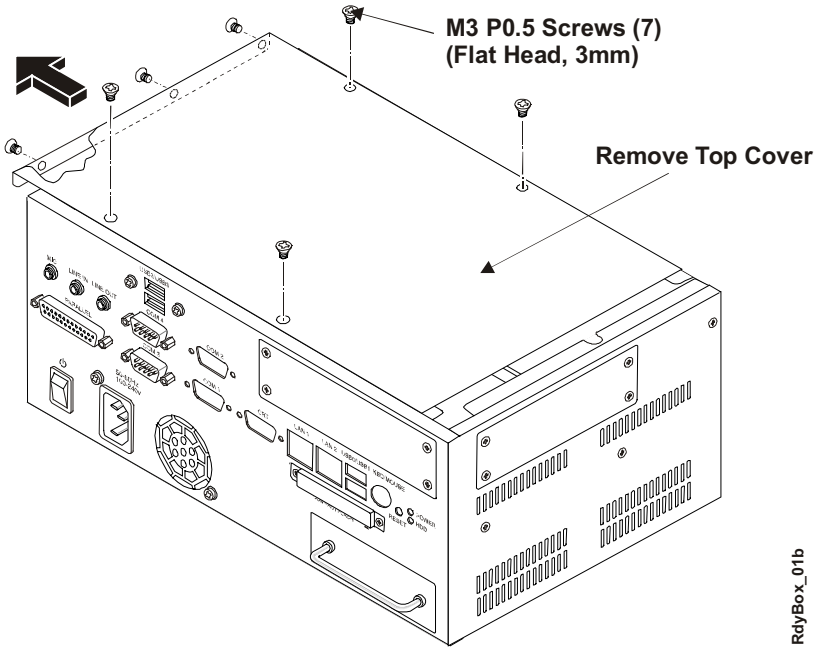


Figure 3-1. Removing the ReadyBox Top Cover

4. Move the internal cables out of the way to allow installation of the ReadyBoard. See Figure 3-2.

   If this is the first time the ReadyBox is being used for ReadyBoard installation, disconnect the shipping tie wraps holding the internal cables and move the cables out of the way.

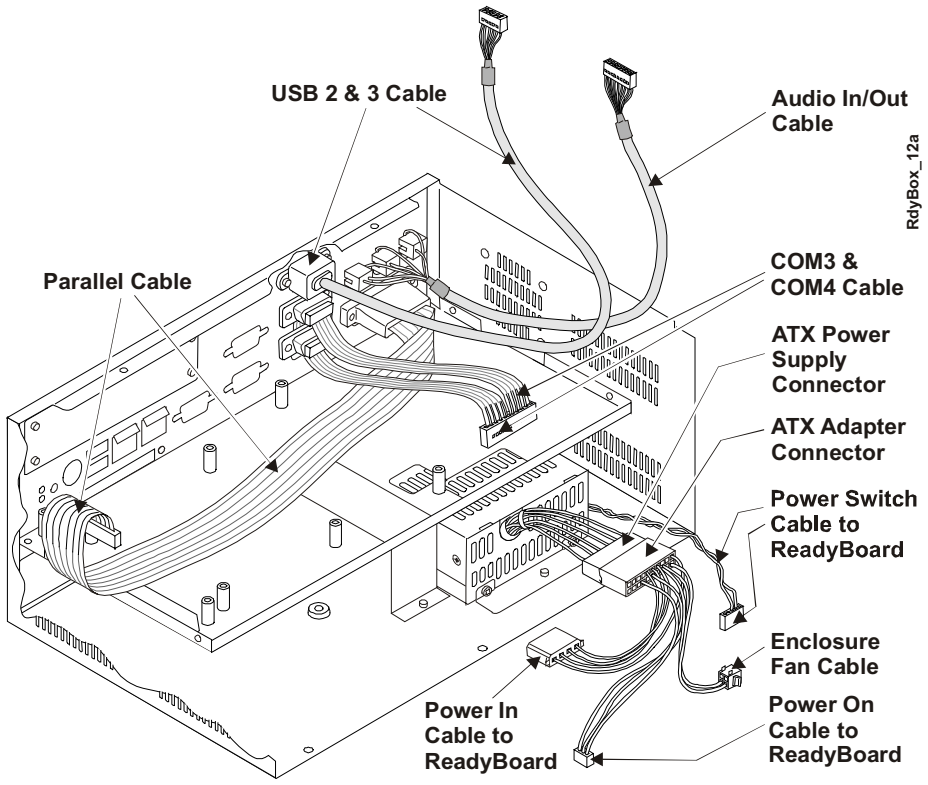


Figure 3-2. Separated Internal Cables

5. Locate the Parallel cable inside the ReadyBox and gently fold it as shown in Figures 3-2 and 3-3, before continuing.

   The Parallel cable must be positioned under the ReadyBoard to reach the floppy/parallel connector on the far right edge of the board while in the enclosure. See Figure 3-2.

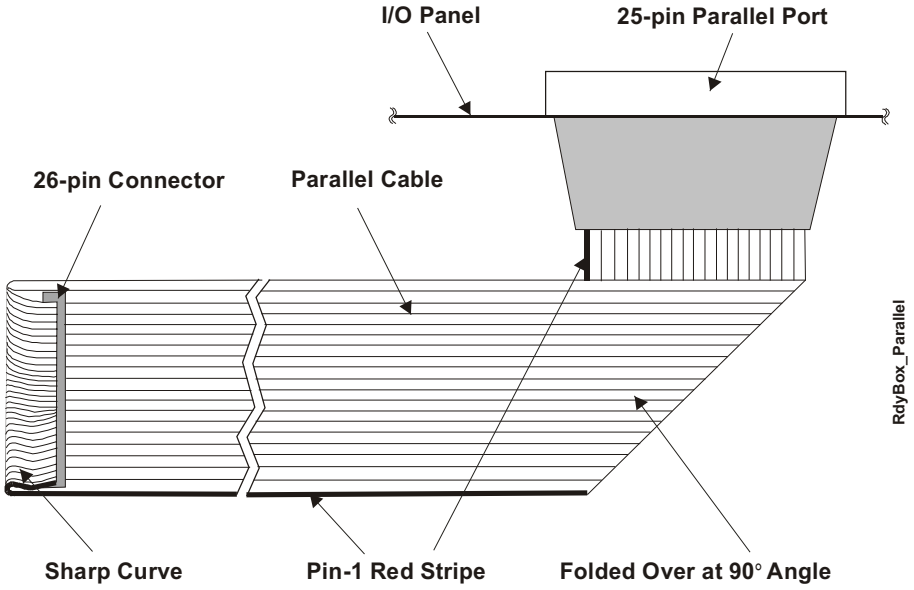


Figure 3-3. Folding the Parallel Cable

CAUTION	To prevent damage to the static sensitive components on the ReadyBoard, ensure you follow good Electrostatic Discharge principles. Components on the ReadyBoard are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling the ReadyBoard: Always use an anti-static wrist/ankle strap and a grounding mat. Before you handle the ReadyBoard, touch a grounded, unpainted metal surface to discharge any static electricity.

6. Ensure you have installed the required SODIMM memory onto the ReadyBoard before continuing.

   Once the ReadyBoard is installed into the ReadyBox, you will not be able to access the SODIMM socket on the ReadyBoard.

7. Position the ReadyBoard near the eight standoffs on the enclosure shelf at about a 10° angle to the mounting shelf. See Figures 3-4 and 3-5.

8. Insert the ReadyBoard and its LAN connectors just under the lip of the two LAN ports on the enclosure wall, behind the I/O panel. See Figure 3-4.

9. Slowly work the ReadyBoard into place, inserting the I/O connectors and LEDs into the respective openings on the I/O Panel.

   When you have the ReadyBoard in position you should clearly see the mounting holes for the eight standoffs under the board mounting holes, and the LEDs should fit into the openings provided on the I/O Panel.

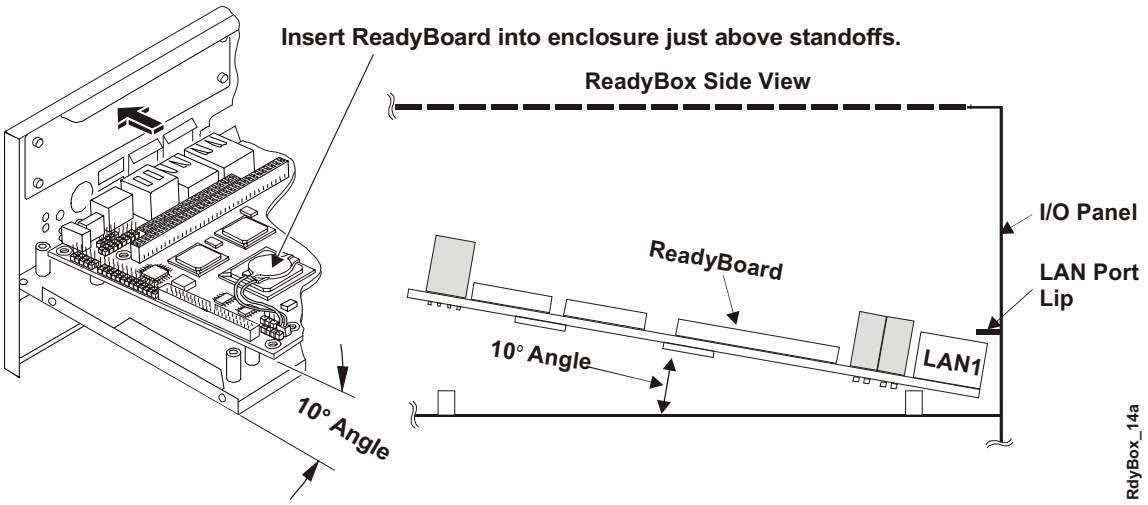


Figure 3-4. ReadyBoard Positioned Under LAN Ports

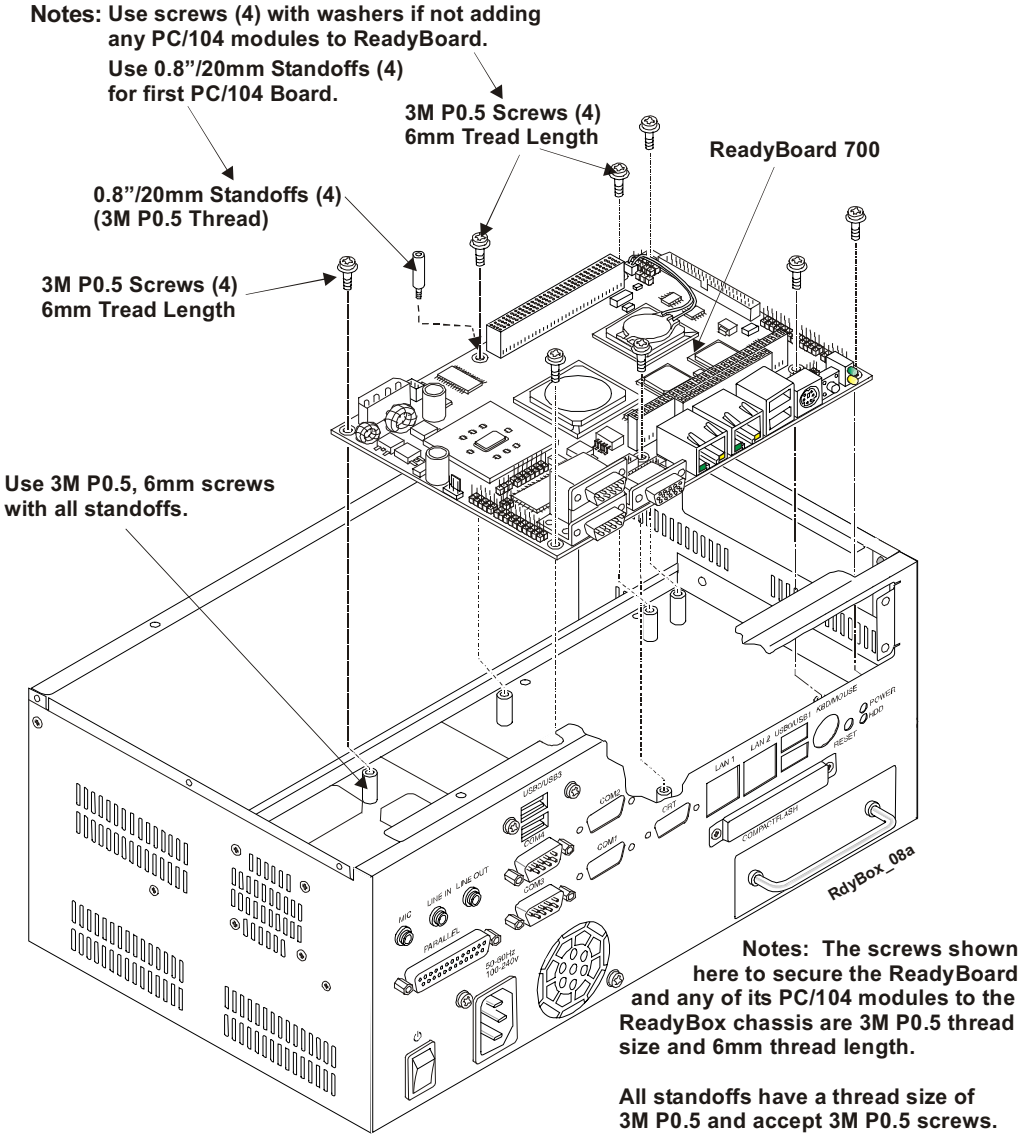

Notes: Use screws (4) with washers if not adding any PC/104 modules to ReadyBoard.
Use 0.8"/20mm Standoffs (4) for first PC/104 Board.
3M P0.5 Screws (4) 6mm Tread Length
ReadyBoard 700
0.8"/20mm Standoffs (4) (3M P0.5 Thread)
3M P0.5 Screws (4) 6mm Tread Length
Use 3M P0.5, 6mm screws with all standoffs.
RdyBox_08a
Notes: The screws shown here to secure the ReadyBoard and any of its PC/104 modules to the ReadyBox chassis are 3M P0.5 thread size and 6mm thread length.
All standoffs have a thread size of 3M P0.5 and accept 3M P0.5 screws.

Figure 3-5. ReadyBoard Over Chassis Standoffs

10. Insert four M3 P0.5 6mm screws with washers into the standoffs on the enclosure shelf at the four corners of the board. See Figure 3-5.
11. If you are putting a PC/104 board onto the ReadyBoard, insert the four 0.8" (20mm) standoffs provided with the ReadyBoard at the four PC/104 mounting locations. See Figure 3-5.

    If you are not installing a PC/104 expansion board, insert four M3 P0.5, 6mm, screws with washers at the four PC/104 mounting locations.
12. Go to the next procedure to connect the remaining cables and to the Hard Disk Drive (2 ½") installation procedure if you are installing an optional hard disk drive.

Connecting Remaining Cables

The following procedure illustrates how to install the remaining cables, except for the IDE cable, to the the ReadyBoard. Refer also to the respective ReadyBoard QuickStart Guide for any variations to board shown in the example figures when connecting the cables to the ReadyBoard. Skip any cable(s) that do not apply to your situation.

- Refer to the *Hard Disk Drive (2 ½") Installation* procedure for the IDE cable, which includes the IDE cable installation.
- Refer to the *Additonal Cooling Fan Installation* procedure to connect the additional fan, which includes the fan power cable. The additional cooling fan is not used unless you need it to keep the higher speed processors from overheating. Refer to Table 2-6 for more information.

NOTE	Ampro recommends using the cable routing shown in the figures. This will help to ensure cables and wiring don't come in contact with the heatsinks.

1. Connect the Power Switch (two-wire) cable to the Utility connector (pins 1 & 2) on ReadyBoard, putting the red wire on pin-1. See Figure 3-6.

   The Utility connector placement differs slightly on the various ReadyBoards, but all Utility connectors use a 5-pin header and are in the general area shown in Figure 3-6. Refer to the respective ReadyBoard QuickStart Guide for any variations, but put the red wire on pin-1.
2. Connect the Power-On and Power In cables to the respective connectors on the ReadyBoard, as shown in Figure 3-6.

   The Power-On (3-pin) connector placement differs slightly on the various ReadyBoards, but all Power In connectors are located in the same place on the board and use a 4-pin header. Refer to the respective ReadyBoard QuickStart Guide for any variations.
3. Connect the COM3 & COM4 cables to the Serial B connector on the ReadyBoard, as shown in Figure 3-6.

   All Serial B connectors are located in the same place on the board and use a 20-pin header. Refer to the respective ReadyBoard QuickStart Guide for the pin-1 location on the board.
4. Connect the USB2 & USB3 cable to the USB2 & USB3 (10-pin) connector on the respective ReadyBoard. See Figure 3-7.

   All USB2 & USB3 connectors are located in the same place on the board and use a 10-pin header. Refer to the respective ReadyBoard QuickStart Guide for the pin-1 location.
5. Connect the Audio cable to the Audio In/Out (16-pin) connector on the respective ReadyBoard. See Figure 3-7.

   The Audio In/Out (16-pin) connector placement differs slightly on the various ReadyBoards, but is in the same generally area on the board. Refer to the respective ReadyBoard QuickStart Guide for any variations and the pin-1 location.

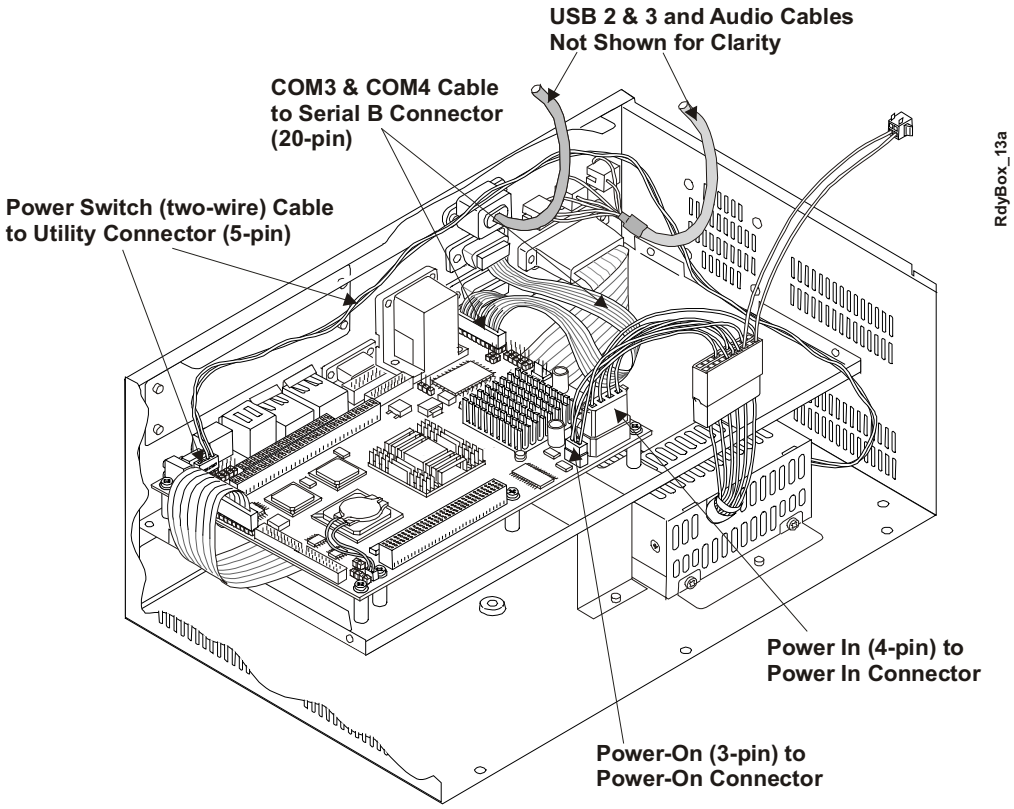


Figure 3-6. Installing Power and Serial Cables

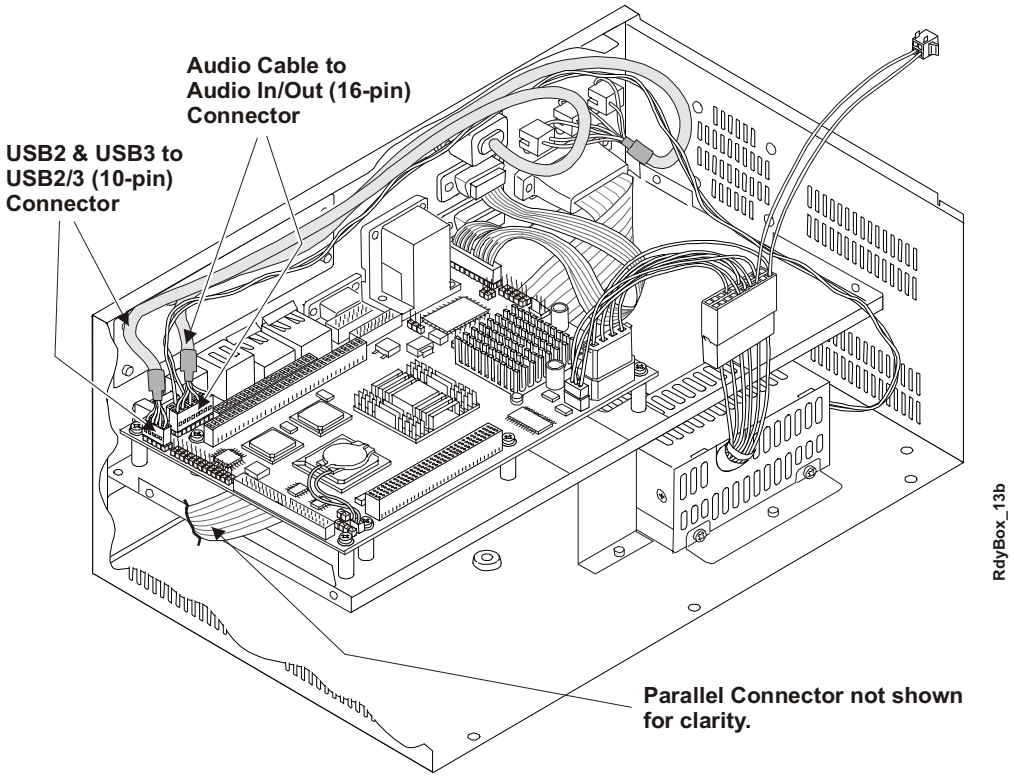


Figure 3-7. Installing Audio and USB Cables

Removing ReadyBoard from ReadyBox

1. Prepare the ReadyBox for the ReadyBoard removal.
   - If the ReadyBox is already prepared for ReadyBoard removal, with the top cover removed, power turned off, and the power cord disconnected, skip to Step 4.
   - If the ReadyBox is not ready for the ReadyBoard removal, continue with the next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the power switch on the ReadyBox is turned off and the power cord has been removed from the power source. The ReadyBox power supply will continue to provide standby current to the chassis until the power cord is disconnected.

2. Initiate a shut down sequence through the OS, or hold the power switch in for 4-6 seconds to turn power off.

   The Power LED should turn off completely when the power is turned off.

3. Disconnect the power cord from the AC power source.

CAUTION	To prevent damage to the static sensitive components on the ReadyBoard, ensure you follow good Electrostatic Discharge principles. Components on the ReadyBoard are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling the ReadyBoard: Always use an anti-static wrist/ankle strap and a grounding mat. Before you handle the ReadyBoard, touch a grounded, unpainted metal surface to discharge any static electricity.

4. Remove the seven screws holding the top cover to the ReadyBox and then slide the cover to the left as shown in the Figure 3-1.
5. Disconnect all of the cables from the ReadyBoard before continuing.

   Refer to the respective ReadyBoard QuickStart Guide for more information.

6. Remove the screws holding the ReadyBoard to the enclosure standoffs.

   If there are PC/104 expansion board(s) connected to the ReadyBoard, you will need to disconnect and remove the PC/104 boards from the ReadyBoard before removing it from the enclosure. Refer to the respective manuals for the PC/104 expansion boards to disconnect and remove these PC/104 boards.

7. Once you have removed all of the screws (and PC/104 boards) slowly work the ReadyBoard out of the enclosure until it is safely clear and place it on a protective surface.

Hard Disk Drive (2 ½") Installation

A hard disk drive (HDD) tray is provided with the ReadyBox and can be removed from the ReadyBox for intallation or removal of the hard disk drive. The HDD tray only holds one 2 ½" hard disk drive with a 44-pin connector and does not require external power.

NOTE	This procedure assumes you have already installed the ReadyBoard into the enclosure and are preparing the HDD tray for installation of the hard disk drive (2 ½"). It also assumes you will be folding and connecting the 44-pin IDE cable to the ReadyBoard before connecting it to the hard disk drive.

Tools Required

Use these tools to install and remove the Hard Disk Drive (2 ½") into the ReadyBox.

- Small to medium Phillips screwdriver
- Anti-static service kit - Use a complete anti-static service kit (or the equivalent) to remove or install the hard disk drive. A complete anti-static service kit should include a static-dissipating work surface, a chassis clip lead, and a wrist or ankle strap.

Removing HDD Tray and Installing IDE Cable

1. Prepare the ReadyBox for the IDE cable installation, which is used for the hard disk drive (2 ½").
   - If the ReadyBox is already prepared for IDE cable installation, with the top cover removed, the HDD tray removed, power turned off, and the power cord disconnected, skip to Step 7.
   - If the ReadyBox is not ready for the IDE cable installation, continue with the next step.

CAUTION	To prevent damage to the ReadyBoard, ensure power in the ReadyBox is turned off and the power cord has been removed from the power source. The ATX power supply inside the ReadyBox will continue to provide standby current to the chassis until the power cord is disconnected.

2. If you have been using the CompactFlash as the drive media, initiate a shut down sequence through the OS, or hold the power switch in for 4-6 seconds to turn power off.

   The Power LED should turn off completely when the power is turned off.
3. Remove the power cord from the AC power source.
4. Remove the seven screws holding the top cover to the ReadyBox and then slide the cover to the left as shown in the Figure 3-1.
5. Turn the ReadyBox on its side or back and remove the four screws securing the HDD tray to the ReadyBox. See Figure 3-8.
6. Slide the HDD tray out of the ReadyBox as shown in the Figure 3-8.

NOTE	Once the HDD tray is out of the ReadyBox, it is much easier to connect the IDE cable to the ReadyBoard by feeding the cable up or down through the cable feed opening. Once you have it connected to the ReadyBoard, then you can position the IDE cable in HDD tray opening, where it is feed out of the enclosure through the HDD tray opening for connection to the new hard disk drive (2 ½").

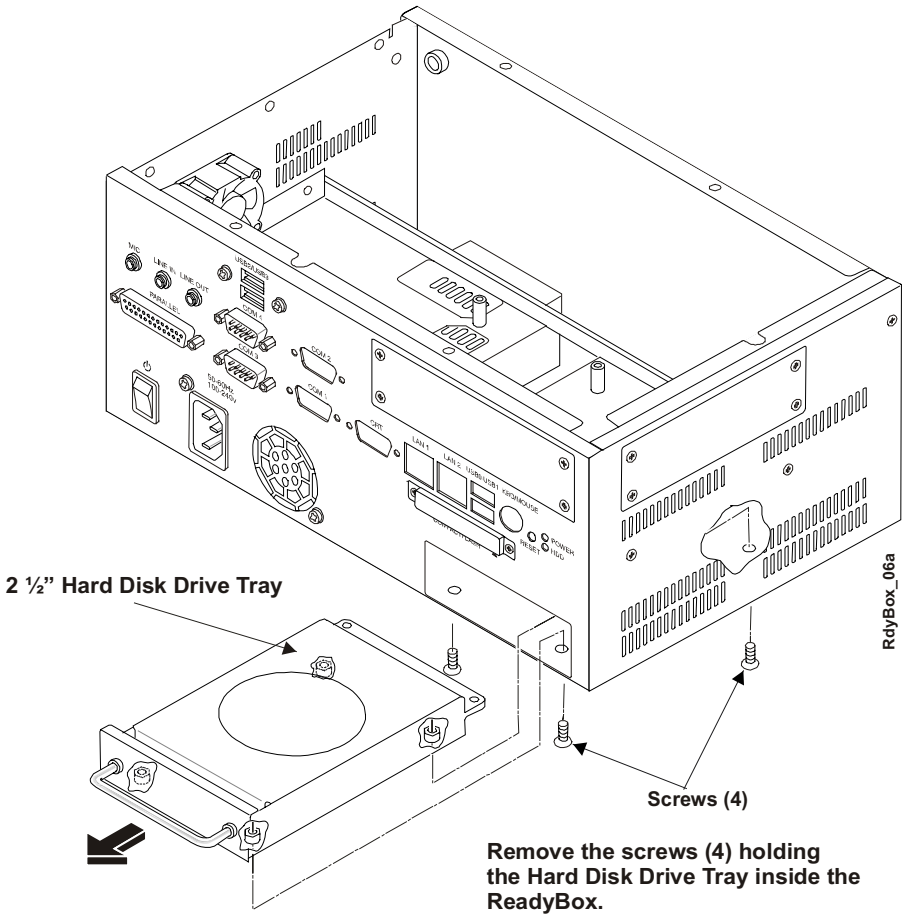


Figure 3-8. Removing the HDD Tray Assembly

6. Locate the 44-pin IDE cable in the ReadyBox hardware kit and prepare it for connection to the ReadyBoard IDE connector, as shown in Figure 3-9.

NOTE	Ampro recommends two extra folds in the IDE cable, but this is not required. This allows the IDE cable to be moved in and out of the tray space more easily.

The IDE cable must be folded with a sharp curve at the end for connection to the ReadyBoard IDE connector with a 90° fold added to the cable, allowing it to lay in the HDD tray. After it is connected to the ReadyBoard connector, the free end of the IDE cable is passed out through the HDD tray opening. From there it can be connected to the HDD (2 ½") and will retract more easily into the HDD tray opening because of the folded portions of the IDE cable.

CAUTION	To prevent damage to the static sensitive components on the ReadyBoard, ensure you follow good Electrostatic Discharge principles. Components on the ReadyBoard are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling the ReadyBoard: Always use an anti-static wrist/ankle strap and a grounding mat. Before you handle the ReadyBoard, touch a grounded, unpainted metal surface to discharge any static electricity.

7. Connect the sharp curved portion of the IDE cable onto the IDE connector on the board, matching pin-1 on the board/connector with the Red stripe of the IDE cable. See Figure 3-10.

NOTE	You can feed the curved portion up through the cable feed opening in the enclosure shelf near the IDE connector, or you can feed the folded portion down through the cable feed opening before connecting the IDE cable. Either way, it is your choice!

Refer to the ReadyBoard's Reference Manual or QuickStart Guide for connector and pin locations.

8. Feed the free end of the IDE cable with the folded section out of the enclosure through the HDD tray opening. See Figure 3-10.

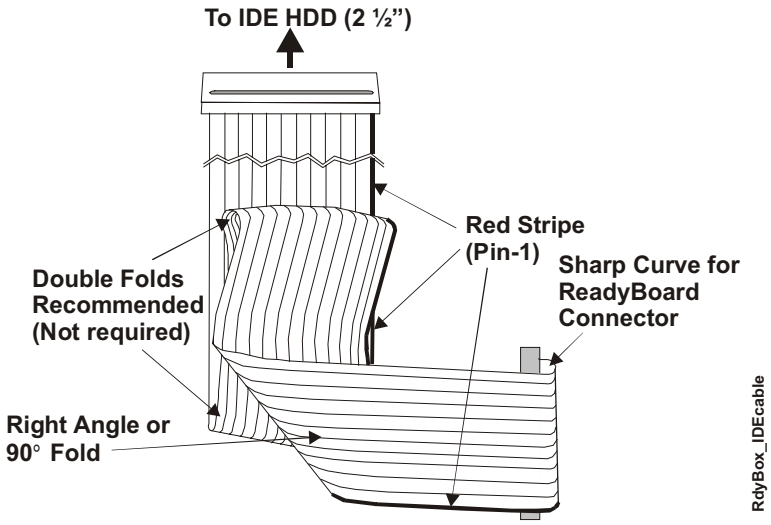


Figure 3-9. Folding the IDE Cable

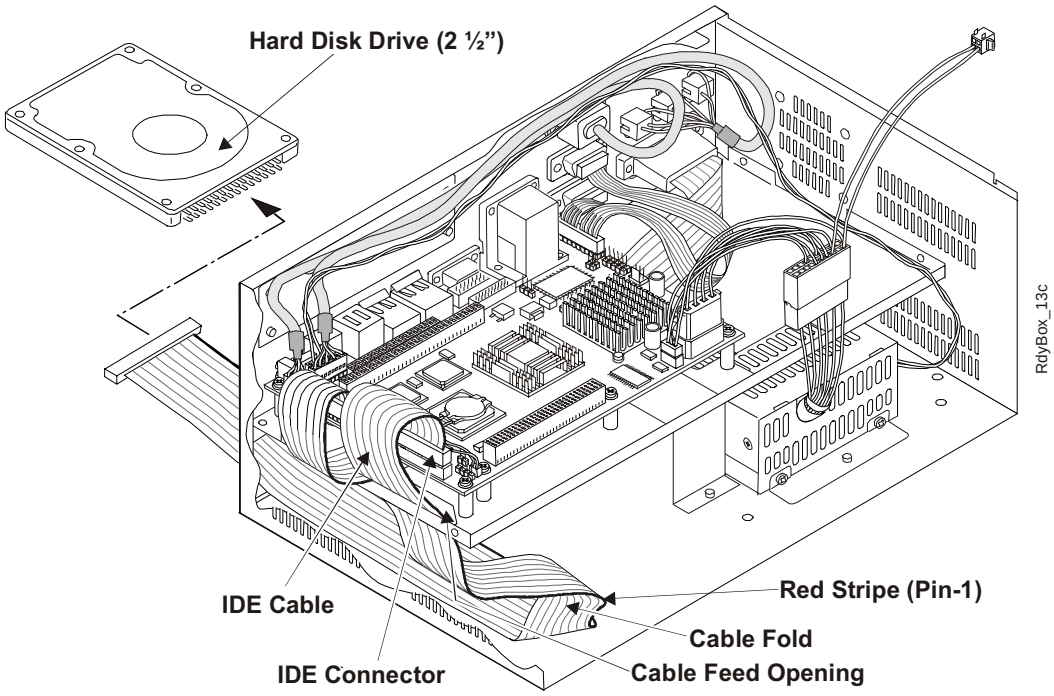


Figure 3-10. Attaching the IDE Cable

Installing Hard Disk Drive (2 ½")

1. If the HDD tray is not already removed from the ReadyBox enclosure, do so before continuing.
2. Remove the four screws holding the HDD tray assembly together. See Figure 3-11.
3. If you want the HDD shock mounted, place the lower rubber shock mount into the tray base and lay the hard disk drive (2 ½") into the shock mount.

   If you do not shock mount the HDD, there are four screw holes for mounting the HDD to the HDD tray base. However, no screws are provided as these are typically provided with the HDD.
4. Connect the 44-pin IDE cable to the hard disk drive (2 ½") by lining up the pin-1 indicator on the disk drive with the red strip on the IDE cable.

   Refer to the pin-1 label or marker on the underside of the hard disk drive (2 ½"). You may need to connect a jumper or change a jumper position if indicated on the drive.

NOTE	The hard disk drive (2 ½") does not require external power because the 44-pin cable provides +5V and ground to the drive.

5. Place the upper rubber shock mount onto the HDD (2 ½") and place the upper tray onto the shock mount.

   Ensure the IDE cable is held between the two halves of the HDD tray before inserting the screws and tighten the assembly.
6. Install the four screws into the respective securing holes.

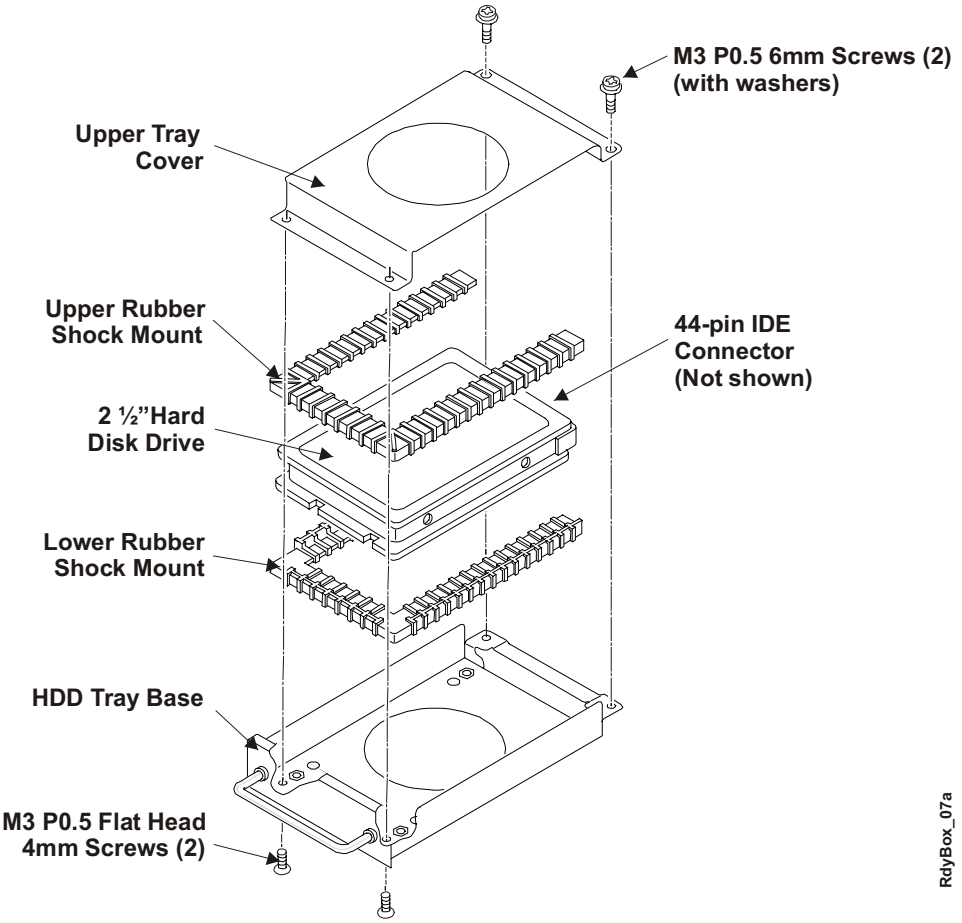


Figure 3-11. Hard Disk Drive (2 ½") Tray Exploded View

Re-Installing the HDD Tray

To reinstall the HDD Tray with the hard disk drive (2 ½") installed, simply reverse the removal procedure, ensuring the IDE cable is moved into the tray opening without damage.

CAUTION	To prevent damage to the IDE cable ensure it moves freely inside the HDD tray opening while you re-install the HDD tray.

1. Gently slide the HDD tray into the tray opening and ensure the IDE cable moves freely into the tray opening. See Figure 3-12.
2. Turn the ReadyBox on its side or back to install the four screws to the HDD tray. See Figure 3-12.
3. Ensure the IDE cable is not twisted or rubbing against any sharp corners inside the enclosure.

   You can use cable ties or clamps to secure the IDE cable, so that it is safely out of the way.
4. Replace the top cover by sliding it on and the re-installing the seven screws.
5. Restore power and check the operation of the hard disk drive.

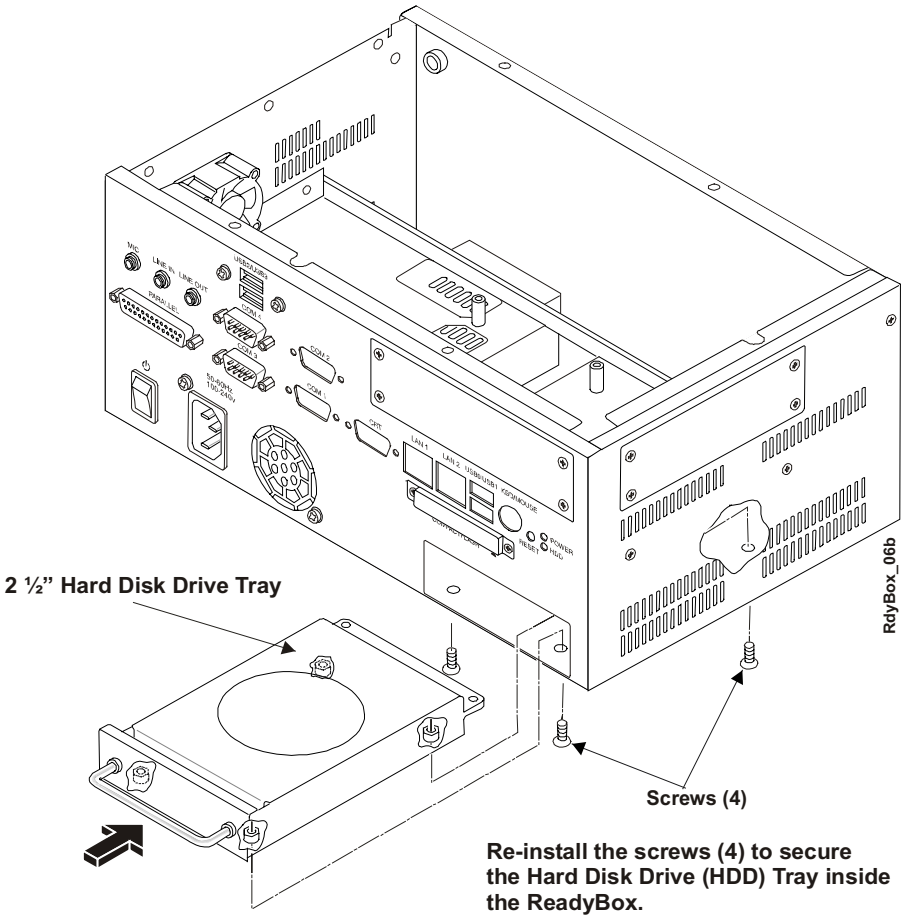

2 ½" Hard Disk Drive Tray
Screws (4)
Re-install the screws (4) to secure the Hard Disk Drive (HDD) Tray inside the ReadyBox.
RdyBox_06b

Figure 3-12. Reinstalling the Hard Disk Drive Tray

CompactFlash Card Installation

This brief procedure describes how to remove the protective cover over the CompactFlash opening and installing the CompactFlash card into the slot opening provided in the I/O panel. Refer to the ReadyBoard QuickStart Guide for specific CompactFlash jumper settings and compatibility.

Tools Required

Use these tools to remove and install the CompactFlash card onto or off of the ReadyBoard Model.

- Small to medium Phillips screwdriver
- Anti-static service kit - Use a complete anti-static service kit (or the equivalent) to remove or install the CompactFlash card. A complete anti-static service kit should include a static-dissipating work surface, a chassis clip lead, and a wrist or ankle strap.

Installing the CompactFlash Card

1. CompactFlash (CF) Card installation preparation:
   - If the ReadyBox is already prepared for CompactFlash installation, including removal of the CF cover, with power turned off and the power cord disconnected, skip to Step 5.
   - If the ReadyBox power is connected and operating, continue with next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the power switch on the ReadyBox is turned off and the power cord has been removed from the AC power source. The ATX power supply will continue to provide standby current to the chassis until the power cord is disconnected.

2. Initiate a shut down sequence through the OS, or hold the power switch in for 4-6 seconds to turn power off.

   The Power LED should turn off completely when the power is turned off.

3. Disconnect the power cord from the AC power source.

CAUTION	To prevent damage to the ReadyBoard or the CompactFlash card, ensure you discharging yourself and following good Electro Static Prevention principals before touching either one. The ReadyBoard and the CompactFlash card are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling either one: Leave the CompactFlash in the anti-static bag until you are ready to install it. Always use an anti-static wrist/ankle strap and a grounding mat. Before you remove a CompactFlash from the anti-static bag, touch a grounded, unpainted metal surface to discharge any static electricity.

4. Use a Phillips screwdriver to remove the CompactFlash cover and place the two screws in a safe place for use later. See Figure 3-13.
5. If necessary, inspect the socket for bent pins or debris on the pins of the CompactFlash socket.
6. Remove the CompactFlash card from its protective bag, handling the CompactFlash card by its edges.

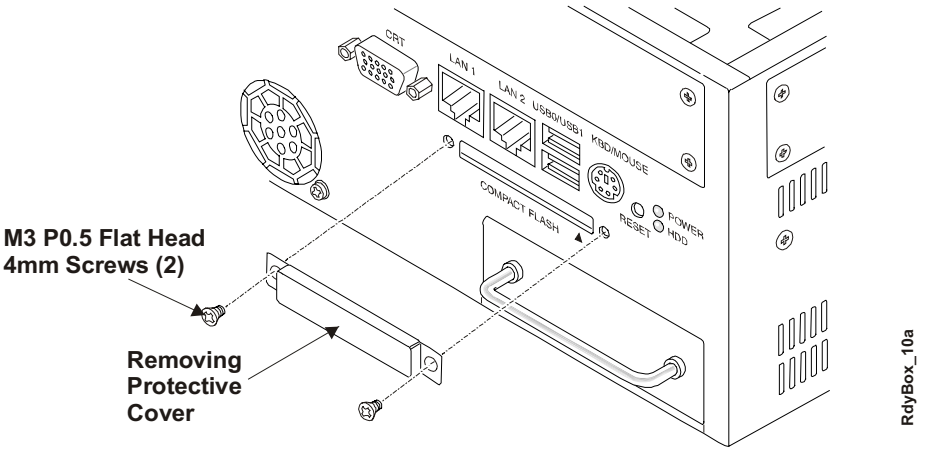


Figure 3-13. Removing CompactFlash Protective Cover

7. Insert the CompactFlash card into the opening provided by matching the pin-1 orientation of the CompactFlash card with the arrowhead on the I/O panel. See Figure 3-14.

   The CompactFlash card edge and pins are keyed to install into the socket in only one orientation. Pin-1 one should be down and to the right as shown in the Figure 3-14.

CAUTION	To prevent damage to the ReadyBoard and CompactFlash card, do not force the CompactFlash card into the slot. If you have to force the CompactFlash card into the slot, it is not installed correctly. The CompactFlash sockets on the ReadyBoard series have enough flexibility in the socket to expand when the CF is installed incorrectly.

8. Push the CompactFlash card into the opening until it is firmly into the socket and mates with the pins. See Figure 3-14.

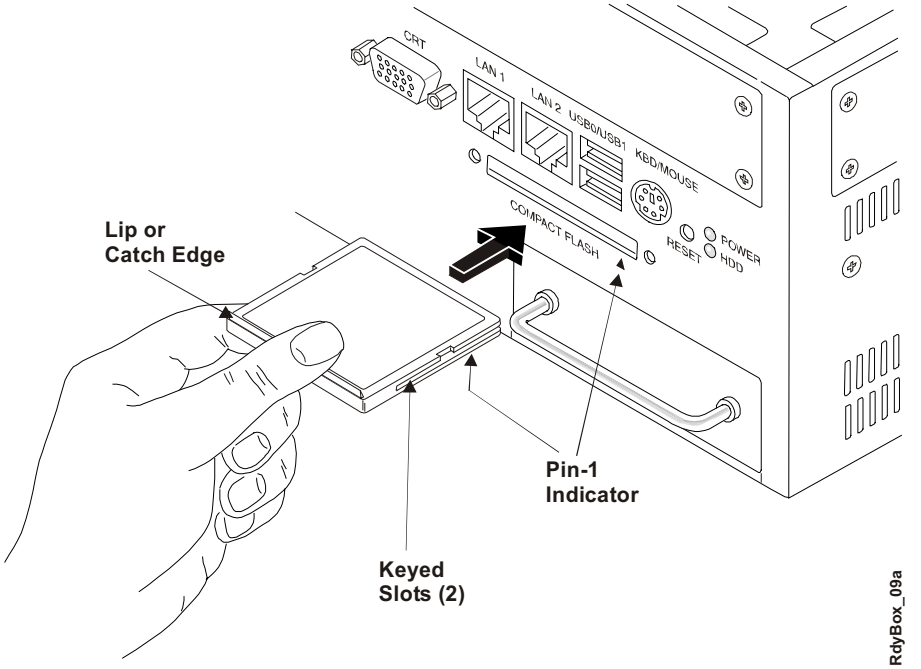


Figure 3-14. Installing the CompactFlash Card

9. If your application or environment requires protection of the CompactFlash card, for security or EMI value, you can re-install the protective cover over the CompactFlash card. See Figure 3-13.

   Reconnecting the protective cover will provide full EMI protection.

10. Refer to the ReadyBoard QuickStart Guide for any required jumper settings for the CompactFlash card, before restoring power to the ReadyBox.

Removing the CompactFlash Card

To remove the CompactFlash card from the ReadyBoard through the ReadyBox opening, simply reverse the installation procedure and follow all of the safety precautions listed.

Additional Cooling Fan Installation

The installation of an additional cooling fan in the enclosure is only required when the ReadyBox is used with specific ReadyBoard models. Refer to Table 2-6 for the ReadyBox-ReadyBoard SBC combinations requiring this additional fan.

Tools Required

Use the tools listed here to install the additional cooling fan into the ReadyBox.

- Small to medium Phillips screwdriver

Installing the Additional Cooling Fan

1. Prepare the ReadyBox for installation of the additional cooling fan.
   - If the ReadyBox is already prepared for the additional cooling fan installation, including removal of the top cover, with power turned off and the AC power cord disconnected, skip to Step 5.
   - If the ReadyBox power is connected and operating, continue with next step.

CAUTION	To prevent damage to the ReadyBoard, ensure the power is turned off in the ReadyBox and the power cord has been removed from the AC power source. The ATX power supply will continue to provide standby current to the chassis until the power cord is disconnected.

2. Initiate a shut down sequence through the OS, or hold the power switch in for 4-6 seconds to turn power off.

   The Power LED should turn off completely when the power is turned off.

3. Disconnect the power cord from the AC power source.

CAUTION	To prevent damage to the ReadyBoard, ensure you discharging yourself and following good Electro Static Prevention principals before touching either one. The ReadyBoard and the CompactFlash card are sensitive to static electricity and can be easily damaged by improper handling. Do the following when handling either one: Leave the CompactFlash in the anti-static bag until you are ready to install it. Always use an anti-static wrist/ankle strap and a grounding mat. Before you remove a CompactFlash from the anti-static bag, touch a grounded, unpainted metal surface to discharge any static electricity.

4. Remove the seven screws holding the top cover to the ReadyBox and then slide the cover to the left as shown in the Figure 3-1.
5. Locate the additional fan in the ReadyBox hardware kit and the four screws included with the fan.

   There should be a short two-wire cable connected to the fan assembly with a 2-pin connector on the end.
6. Place the fan assembly on the inside of the enclosure with the airflow indicator (arrow) pointing out of the enclosure. See Figure 3-15.

   The fan has an arrow embossed on the fan housing indicating the direction of the airflow.
7. Use the four self-tapping screws to secure the fan to the inside of the enclosure. See Figure 3-15.
8. Connect the 2-pin connector to the free 2-pin connector from the ATX power supply adapter.

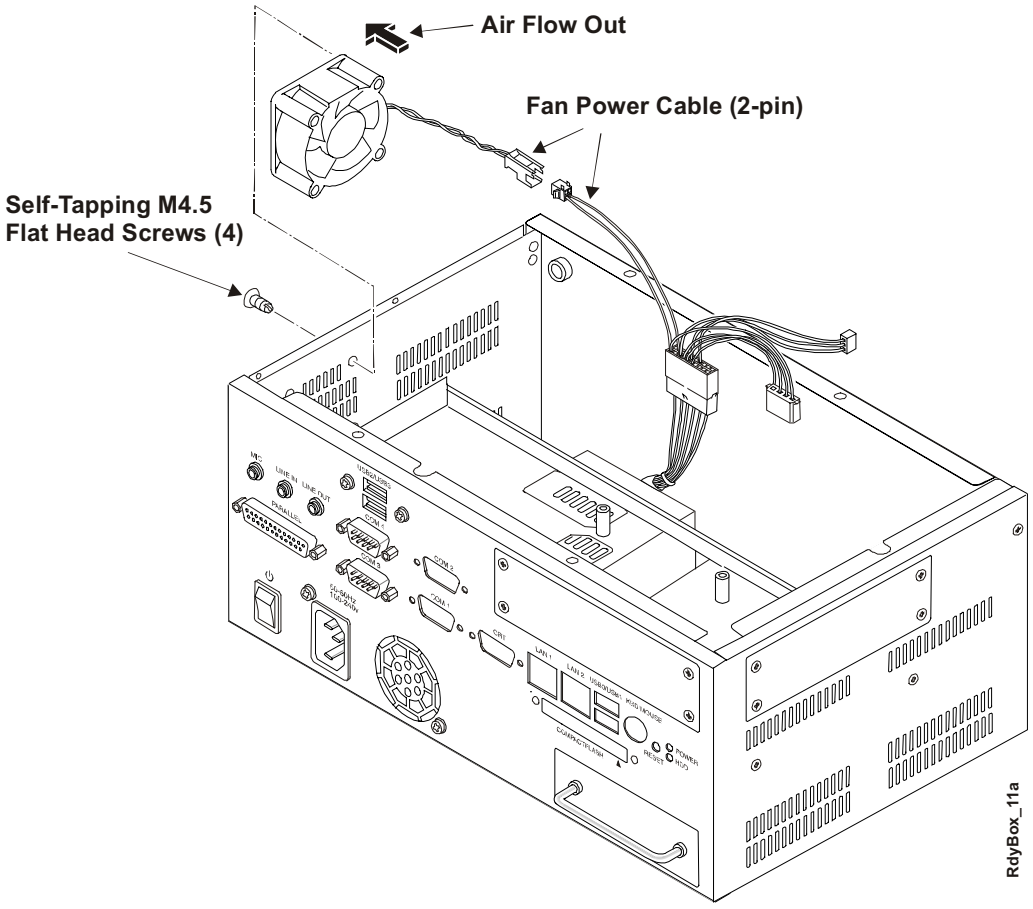


Figure 3-15. Installing the Additional Cooling Fan

Removing the Additional Cooling Fan

To remove the additional cooling fan from the ReadyBox enclosure, simply reverse the installation procedure and follow all of the safety precautions listed.

Chapter 4 Hardware Reference

Overview

This chapter describes the connectors provided by the ReadyBox that connect to the ReadyBoard while in the ReadyBox enclosure.

The ReadyBox connectors are listed in the following order:

- IDE hard disk drive (2 ½") Interface
- Parallel Interface
- Serial Interfaces (Serial 3 and 4)
- USB Connectors (USB 2 and 3)
- Audio Interface (Line In, Line Out, Mic In)
- Power Switch
- Power Interfaces
  - ATX Power Supply
  - Power In connector
  - Power On connector

NOTE	Ampro Computers, Inc. only supports the features/options tested and listed in this manual. Some of the components used in the ReadyBox may provide more features or options than are listed for the ReadyBox, but some of these component features/options are not supported in the box and may not function as specified in the component documentation.

NOTE	Refer to the specific ReadyBoard SBC Reference Manual and QuickStart Guide for more information concerning the connectors and cables not listed in this chapter.

IDE HDD (2 ½") Interface

The ReadyBox provides one IDE cable assembly for a 2 ½" IDE hard disk drive (HDD) and one CompactFlash slot for the CompactFlash socket on the ReadyBoard SBC.

The EIDE interface supports the following features:

- Standard 44-pin 2mm header
- Supports one 2 ½" IDE hard disk drive in the drive tray (shock mounts and hardware provided)
- No external power required (+5 volts provided at pins 41, 42)

Table 4-1 gives the signals for the IDE 44-pin, 2mm cable.

Table 4-1. Primary IDE Interface Pin/Signal Descriptions

Pin #	Signal	Description
1	RESET*	Low active hardware reset (RSTDRV inverted)
2	GND	Digital Ground
3	PDD7	Primary Disk Data 7 – These signals (0 to 15) provide the disk data signals.
4	PDD8	Primary Disk Data 8 – These signals (0 to 15) provide the disk data signals.
5	PDD6	Primary Disk Data 6 – These signals (0 to 15) provide the disk data signals.
6	PDD9	Primary Disk Data 9 – These signals (0 to 15) provide the disk data signals.
7	PDD5	Primary Disk Data 5 – These signals (0 to 15) provide the disk data signals.
8	PDD10	Primary Disk Data 10 – These signals (0 to 15) provide the disk data signals.
9	PDD4	Primary Disk Data 4 – These signals (0 to 15) provide the disk data signals.
10	PDD11	Primary Disk Data 11 – These signals (0 to 15) provide the disk data signals.
11	PDD3	Primary Disk Data 3 – These signals (0 to 15) provide the disk data signals.
12	PDD12	Primary Disk Data 12 – These signals (0 to 15) provide the disk data signals.
13	PDD2	Primary Disk Data 2 – These signals (0 to 15) provide the disk data signals.
14	PDD13	Primary Disk Data 13 – These signals (0 to 15) provide the disk data signals.
15	PDD1	Primary Disk Data 1 – These signals (0 to 15) provide the disk data signals.
16	PDD14	Primary Disk Data 14 – These signals (0 to 15) provide the disk data signals.
17	PDD0	Primary Disk Data 0 – These signals (0 to 15) provide the disk data signals.
18	PDD15	Primary Disk Data 15 – These signals (0 to 15) provide the disk data signals.
19	GND	Digital Ground
20	NC-Key	Not Connected - Key pin plug
21	PDDREQ	Primary Device DMA Channel Request – Used for DMA transfers between host and drive (direction of transfer controlled by DIOR* and DIOW*). Also used in an asynchronous mode with DMACK*. Drive asserts IDRQ0 when ready to transfer or receive data.
22	GND	Digital Ground
23	PDIOW*	Primary Device I/O Read/Write Strobe – Strobe signal for write functions. Negative edge enables data from a register or data port of the drive onto the host data bus. Positive edge latches data at the host.
24	GND	Digital Ground

Pin #	Signal	Description
25	PDIOR*	Primary I/O Read/Write Strobe – Strobe signal for read functions. Negative edge enables data from a register or data port of the drive onto the host data bus. Positive edge latches data at the host.
26	GND	Digital Ground
27	PDIORDY	Primary I/O Channel Ready – When negated extends the host transfer cycle of any host register access when the drive is not ready to respond to a data transfer request. High impedance if asserted.
28	PDCEL	Primary Cable Select – Used to configure IDE drives as device 0 or device 1 using a special cable.
29	PDDACK*	Primary DMA Channel Acknowledge – Used by the host to acknowledge data has been accepted or data is available. Used in response to DMARQ asserted.
30	GND	Digital Ground
31	IRQ14	Interrupt Request 14 – Asserted by drive when it has pending interrupt (PIO transfer of data to or from the drive to the host).
32	NC	Not connected
33	PDA1	Primary IDE ATA Primary Disk Address (0 to 2) – Used to indicate which byte in the ATA command block or control block is being accessed
34	PD33/66	UDMA 33/66 Sense – Senses which DMA mode to use for IDE devices.
35	PDA0	Primary IDE ATA Disk Address (0 to 2) – Used to indicate which byte in the ATA command block or control block is being accessed
36	PDA2	Primary IDE ATA Disk Address (0 to 2) – Used to indicate which byte in the ATA command block or control block is being accessed
37	PDCS1*	Primary Slave/Master Chip Select 1 – Used to select the host-accessible Command Block Register.
38	PDCS3*	Primary Slave/Master Chip Select 3 – Used to select the host-accessible Command Block Register.
39	Reserved	Reserved
40	GND	Digital Ground
41	+5V	+5 volts +/-5%
42	+5V	+5 volts +/-5%
43	GND	Digital Ground
44	NC	Not connected

Notes: The shaded area denotes power or ground. The signals marked with * = Negative true logic.

Parallel Interface

The ReadyBox provides a parallel port connector on the I/O panel with a 25-pin ribbon cable that connects to the floppy/parallel connector on the specific ReadyBoard.

The ReadyBox provides the standard D-shell 25-pin (DB25) parallel connector, which supports the following protocols:

- SPP (Standard Printer Port)
- Bi-directional SPP
- ECP (Enhanced Capabilities Port)
- EPP (Enhanced Parallel Port)

Refer to the specific ReadyBoard Reference Manual for more information and to the following table for the parallel port pin assignments.

Table 4-2. Parallel Interface Pin/Signal Descriptions

Pin #	Signal	Description
1	Strobe*	Strobe* – This is an output signal used to strobe data into the printer. I/O pin in ECP/EPP mode.
2	PD0 INDEX*	Parallel Port Data 0 – This pin (0 to 7) provides parallel port data signals. Index – Sense detects the head is positioned over the beginning of a track
3	PD1 TRK0*	Parallel Port Data 1 – This pin (0 to 7) provides parallel port data signals. Track 0 – Sensing detects the head is positioned over track 0.
4	PD2 WPRT*	Parallel Port Data 2 – This pin (0 to 7) provides parallel port data signals. Write Protect – Senses the diskette is write protected.
5	PD3 RDATA*	Parallel Port Data 3 – This pin (0 to 7) provides parallel port data signals. Read Data – Raw serial bit stream from the drive for read operations.
6	PD4 DSKCHG*	Parallel Port Data 4 – This pin (0 to 7) provides parallel port data signals. Disk Change – Senses the drive door is open or the diskette has been changed since the last drive selection.
7	PD5	Parallel Port Data 5 – This pin (0 to 7) provides parallel port data signals.
8	PD6	Parallel Port Data 6 – This pin (0 to 7) provides parallel port data signals.
9	PD7	Parallel Port Data 7 – This pin (0 to 7) provides parallel port data signals.
10	ACK* DS1*	Acknowledge * – This is a status output signal from the printer. A Low State indicates it has received the data and is ready to accept new data. Drive Select 1 – Select drive 1.
11	BUSY MTR1*	Busy – This is a status output signal from the printer. A High State indicates the printer is not ready to accept data. Motor Control 1 – Select motor on drive 1.
12	PE WDATA*	Paper End – This is a status output signal from the printer. A High State indicates it is out of paper. Write Data – Encoded data to the drive for write operations.
13	SLCTIN STEP*	Select In – This output signal to the printer is used to select the printer. I/O pin in ECP/EPP mode. Step – Low pulse for each track-to-track movement of the head.

Pin #	Signal	Description
14	AUTOFDX*	Auto Feed* – This is a request signal into the printer to automatically feed one line after each line is printed.
	DRVEN0*	Floppy Drive Density Select 0 –
15	ERR*	Error – This is a status output signal from the printer. A Low State indicates an error condition on the printer.
	HDSEL*	Head Select – Selects the side for Read/Write operations (0 = side 1, 1 = side 0)
16	PINIT*	Printer Initialize* – This signal used to Initialize printer. Output in standard mode, I/O in ECP/EPP mode.
	DIR*	Direction – Direction of head movement (0 = inward motion, 1 = outward motion).
17	PTSLCT	Printer Select – This is a status output signal from the printer. A High State indicates it is selected and powered on.
	WGATE*	Write Gate – Signal to the drive to enable current flow in the write head.
18	GND	Digital Ground
19	GND	Digital Ground
20	GND	Digital Ground
21	GND	Digital Ground
22	GND	Digital Ground
23	GND	Digital Ground
24	GND	Digital Ground
25	GND	Digital Ground
26	NC	Not Connected

Notes: The shaded area denotes power or ground. The signals marked with * = Negative true logic. The Parallel port signals are shown first, followed by the floppy drive signals for any given pin number.

NOTE	The floppy and parallel ports share the same connector on any of the ReadyBoard models, so you will see the parallel port signals shared with floppy signals in the signal pin descriptions of the table.

Serial Interface

The ReadyBox supports 4 serial ports, Serial 1 (COM1), Serial 2 (COM2), Serial 3 (COM3), and Serial 4 (COM4). The ReadyBoard provides two of four standard D-shell 9-pin (DB9) connectors on the board for Serial 1 (COM1) and Serial 2, (COM2). The ReadyBox provides the other two standard DB9 connectors for Serial 3 (COM3) and Serial 4 (COM4) with cables connecting at the ReadyBoard Serial B header for Serial 3 (COM3) and Serial 4 (COM4) ports.

- The ReadyBox supports two of the four standard D-shell 9-pin (DB9) connectors
  - Serial Port 3 (COM3) supports RS232/RS485/RS422
  - Serial Port 4 (COM4) supports RS232/RS485/RS422

Refer to the specific ReadyBoard Reference Manual for more information

NOTE	The RS232 and RS485/RS422 modes must be selected in the ReadyBoard BIOS Setup Utility. Generally, the RS232 mode is the default selection (Standard) for any serial port.

To implement the RS485 mode on Serial port 3 or 4 (COM3 or COM4), you must tie the correct pins together for each port. For example; on Serial port 3, tie pin 2 (RX3-) to 3 (TX3-) and pin 7 (TX3+) to 8 (RX3+) at the DB9 serial connector for Serial port 3 or 4 as shown in Figure 3-1. The RS422 mode uses a four-wire interface and does not need any pins tied together, but you must select RS485 in BIOS Setup.

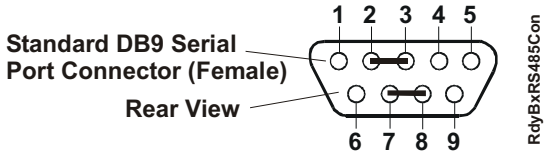


Figure 4-1. RS485 Serial Port Implementation

Tables 4-3 and 4-4 give the pins and corresponding signals for Serial Ports 3 (COM3) and 4 (COM4).

Table 4-3. Serial 3 Port Connector Pin/Signal Descriptions

Pin #	Signal	Description
1	DCD3	Data Carrier Detect 3 – Indicator to serial port 1 that external modem is detecting a carrier signal (i.e., a communication channel is currently open). In direct connect environments, this input will be driven by DTR1 as part of the DTR/DSR handshake.
2	RX3 RX3-	Receive Data 3 – Serial port 3 receive data in RX3- – If in RS485 or RS422 mode, this pin is Receive Data 3 -.
3	TX3 TX3-	Transmit Data 3 – Serial port 3 transmit data out TX3- – If in RS485 or RS422 mode, this pin is Transmit Data 3 -.
4	DTR3	Data Terminal Ready 3 – Serial port 1 indicator that port is powered, initialized, and ready. Used as hardware handshake with DSR1 for overall readiness to communicate.
5	GND	Ground
6	DSR3	Data Set Ready 3 – Indicator to serial port 1 that external serial communications device is powered, initialized, and ready. Used as hardware handshake with DTR3 for overall readiness to communicate.

Pin #	Signal	Description
7	RTS3 TX3+	Request To Send 3 – Indicator to serial output port 3 is ready to transmit data. Used as hardware handshake with CTS3 for low level flow control. TX3+ – If in RS485 or RS422 mode, this pin is Transmit Data 3 +.
8	CTS3 RX3+	Clear To Send 3 – Indicator to serial port 3 that external serial communications device is ready to receive data. Used as hardware handshake with RTS3 for low level flow control. RX3+ – If in RS485 or RS422 mode, this pin is Receive Data 3 +.
9	NC	Not connected

Table 4-4. Serial 4 Port Connector Pin/Signal Descriptions

1	DCD4	Data Carrier Detect 4 – Indicator to serial port 1 that external modem is detecting a carrier signal (i.e., a communication channel is currently open). In direct connect environments, this input will be driven by DTR1 as part of the DTR/DSR handshake.
2	RX4 RX4-	Receive Data 4 – Serial port 4 receive data in RX4- – If in RS485 or RS422 mode, this pin is Receive Data 4 -.
3	TX4 TX4-	Transmit Data 4 – Serial port 4 transmit data out TX4- – If in RS485 or RS422 mode, this pin is Transmit Data 4 -.
4	DTR4	Data Terminal Ready 4 – Serial port 1 indicator that port is powered, initialized, and ready. Used as hardware handshake with DSR1 for overall readiness to communicate.
5	GND	Ground
6	DSR4	Data Set Ready 4 – Indicator to serial port 1 that external serial communications device is powered, initialized, and ready. Used as hardware handshake with DTR1 for overall readiness to communicate.
7	RTS4 TX4+	Request To Send 4 – Indicator to serial output port 4 is ready to transmit data. Used as hardware handshake with CTS4 for low level flow control. TX4+ – If in RS485 or RS422 mode, this pin is Transmit Data 4 +.
8	CTS4 RX4+	Clear To Send 4 – Indicator to serial port 4 that external serial communications device is ready to receive data. Used as hardware handshake with RTS4 for low level flow control. RX4+ – If in RS485 or RS422 mode, this pin is Receive Data 4 +.
9	NC	Not connected

Notes: The shaded area denotes power or ground. RS232 signals are listed first followed by RS485/RS422 signals.

USB Interface

The ReadyBox supports four USB ports, USB0, USB1, USB2 and USB3. The ReadyBoard provides two of four standard USB connectors on the board for USB0 and USB1. The ReadyBox provides the other two standard USB connectors for USB2 and USB3 with a cable to connect at the ReadyBoard USB header for USB2 and USB3.

The ReadyBox provides two of the four standard USB connectors

- USB2 (4-pin)
- USB3 (4-pin)

The ReadyBox can also support, through the specific ReadyBoard, the following items when connected to the USB ports:

- USB 1.1 or USB 2.0 standard devices
- USB hard disk drives
- USB CD-ROMs
- USB floppy drives
- USB keyboard and mouse

Refer to the specific ReadyBoard Reference Manual for more information.

Table 4-5. USB 2 Port Pin/Signal Descriptions

Pin #	Signal	Description
1	+5V	+5V
2	USBP2-	Universal Serial Bus Port 2 Data Negative
3	USBP2+	Universal Serial Bus Port 2 Data Positive
4	GND	Ground

Notes: The shaded area denotes power or ground

Table 4-6. USB 3 Port Pin/Signal Descriptions

1	+5V	+5V
2	USBP3-	Universal Serial Bus Port 3 Data Negative
3	USBP3+	Universal Serial Bus Port 3 Data Positive
4	GND	Ground

Notes: The shaded area denotes power or ground

Audio Interface

The ReadyBox provides three audio connectors in the I/O panel that connect to the ReadyBoard SBC through the 16-pin Audio In/Out connector. Refer to the Reference Manual for the specific ReadyBoard SBC for more information.

- Stereo Line In
- Stereo Line out
- Microphone (mono) in

Table 4-7. Audio Interface Pin/Signal Descriptions

Connector	Signal	Description	Audio In/Out Pin #
Audio In/Out	NC	Not Connected	1, 2, 3, 4, 8, 12, 13, 14
Line Out	LINE_OUT_L	Line Out signal left channel	5
	LINE_OUT_R	Line Out signal right channel	6
	GND_AUD	Audio ground	7
Line In	LINE_IN_L	Line in signal left channel	9
	LINE_IN_R	Line in signal right channel	10
	GND_AUD	Audio ground	11
MIC In	MIC_IN	Microphone signal in	15
	GND_AUD	Audio ground	16

Notes: The shaded area denotes power or ground.

Power Interface

The ReadyBox provides an ATX power supply to power the ReadyBoard installed in the enclosure. The power supply provides the standard ATX power supply voltages, but not all of these voltages are used on the ReadyBoard products. The ReadyBoard products only require one externally supplied +5 volts DC +/- 5%. The ReadyBox provides two connectors Power In and Power On for connection to the ReadyBoard product. The Power In connector uses a 4-pin header with 0.200" (5.08mm) spacing.

ATX Power Supply

Table 4-8 gives the pinouts and signals for Power Supply connector.

Table 4-8. ATX Power Supply Interface Pin/Signal Descriptions

Pin #	Signal	Description	Pin #	Signal	Description
1	+3.3V	+3.3 volts DC +/- 5%	11	+3.3V	+3.3 volts DC +/- 5%
2	+3.3V	+3.3 volts DC +/- 5%	12	-12V	This -12V is are for BUS power only (optional)
3	GND	Ground	13	GND	Ground
4	+5.0V	+5.0 volts DC +/- 5%	14	PS-ON*	Enable signal to ATX power supply
5	GND	Ground	15	GND	Ground
6	+5.0V	+5.0 volts DC +/- 5%	16	GND	Ground
7	GND	Ground	17	GND	Ground
8	PW-OK	Power Ok or Good signal from ATX Power supply	18	-5.0V	-5.0 volts DC +/- 5%
9	5VSB	+5.0 suspend voltage (+5V, 100mA Standby)	19	+5.0V	+5.0 volts DC +/- 5%
10	+12V	+12V used for Bus power (optional)	20	+5.0V	+5.0 volts DC +/- 5%

Notes: The shaded area denotes power or ground. The +12 and +3.3 voltages on a typical ATX power supply output connector are used for the PCI and ISA bus.

Table 4-9. ATX Power Interface to Power Adapter Pin Configuration

Pin #	Signal	To Adapters & Cable	Pin #	Signal	To Adapters & Cable
1	+3.3V	Not connected	11	+3.3V	Not connected
2	+3.3V	Not connected	12	-12V	Not connected
3	GND	Not connected	13	GND	Not connected
4	+5.0V	To Power-In, pin-1 +5V	14	PS-ON*	To Power On, pin-3 PS_ON
5	GND	To Power-In, pin-3 GND	15	GND	Not connected
6	+5.0V	Not connected	16	GND	To Power On, pin-2 GND
7	GND	To Power-In, pin-2 GND Fan Ground	17	GND	Not connected
8	PW-OK	Not connected	18	-5.0V	Not connected
9	5VSB	To Power-On, pin-1 5VSB	19	+5.0V	Not connected
10	+12V	To Power-In, pin-4 (not used on all ReadyBoards) and Fan power	20	+5.0V	Not connected

Notes: The shaded area denotes power or ground.

Power Switch

The ReadyBox provides a Power switch to control the power state of the ReadyBoard product. The power switch is a momentary push button switch with a 2-pin cable assembly for attaching to the ReadyBoard product Utility connector.

NOTE	This switch cable must be connected to the correct pins on the Utility connector to control the power state of the ReadyBoard product.

Table 4-10. Utility Interface Pin/Signal Descriptions

Pin #	Signal	Description	Power Switch connection
1	PS_0n	Power On Output	Red wire of 2-pin connector
2	GND	Ground	Black wire of 2-pin connector
3	RST_SW	Reset Switch Output	Not used
4	+5V	+5 Volts	Not used
5	SPKR+	Speaker + Output	Not used

Notes: The shaded area denotes power or ground.

Appendix A Technical Support

Ampro Computers, Inc. provides a number of methods for contacting Technical Support listed in the Table A-1 below. Requests for support through the Virtual Technician are given the highest priority, and usually will be addressed within one working day.

- Ampro Virtual Technician – This is a comprehensive support center designed to meet all your technical needs. This service is free and available 24 hours a day through the Ampro web site at http://ampro.custhelp.com. This includes a searchable database of Frequently Asked Questions, which will help you with the common information requested by most customers. This is a good source of information to look at first for your technical solutions. However, you must register online before you can login to access this service.
- Personal Assistance – You may also request personal assistance by going to the "Ask a Question" area in the Virtual Technician. Requests can be submitted 24 hours a day, 7 days a week. You will receive immediate confirmation that your request has been entered. Once you have submitted your request you can go to the "My Stuff" area and log in to check status, update your request, and access other features.
- Embedded Design Resource Center – This service is also free and available 24 hours a day at the Ampro web site at http://www.ampro.com. However, you must be registered online before you can login to access this service.

  The Embedded Design Resource Center was created as a resource for embedded system developers to share Ampro's knowledge, insight, and expertise gained from years of experience. This page contains links to White Papers, Specifications, and additional technical information.

Table A-1. Technical Support Contact Information

Method	Contact Information
Virtual Technician	http://ampro.custhelp.com
Web Site	http://www.ampro.com
Standard Mail	Ampro Computers, Incorporated 5215 Hellyer Avenue San Jose, CA 95138-1007, USA

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